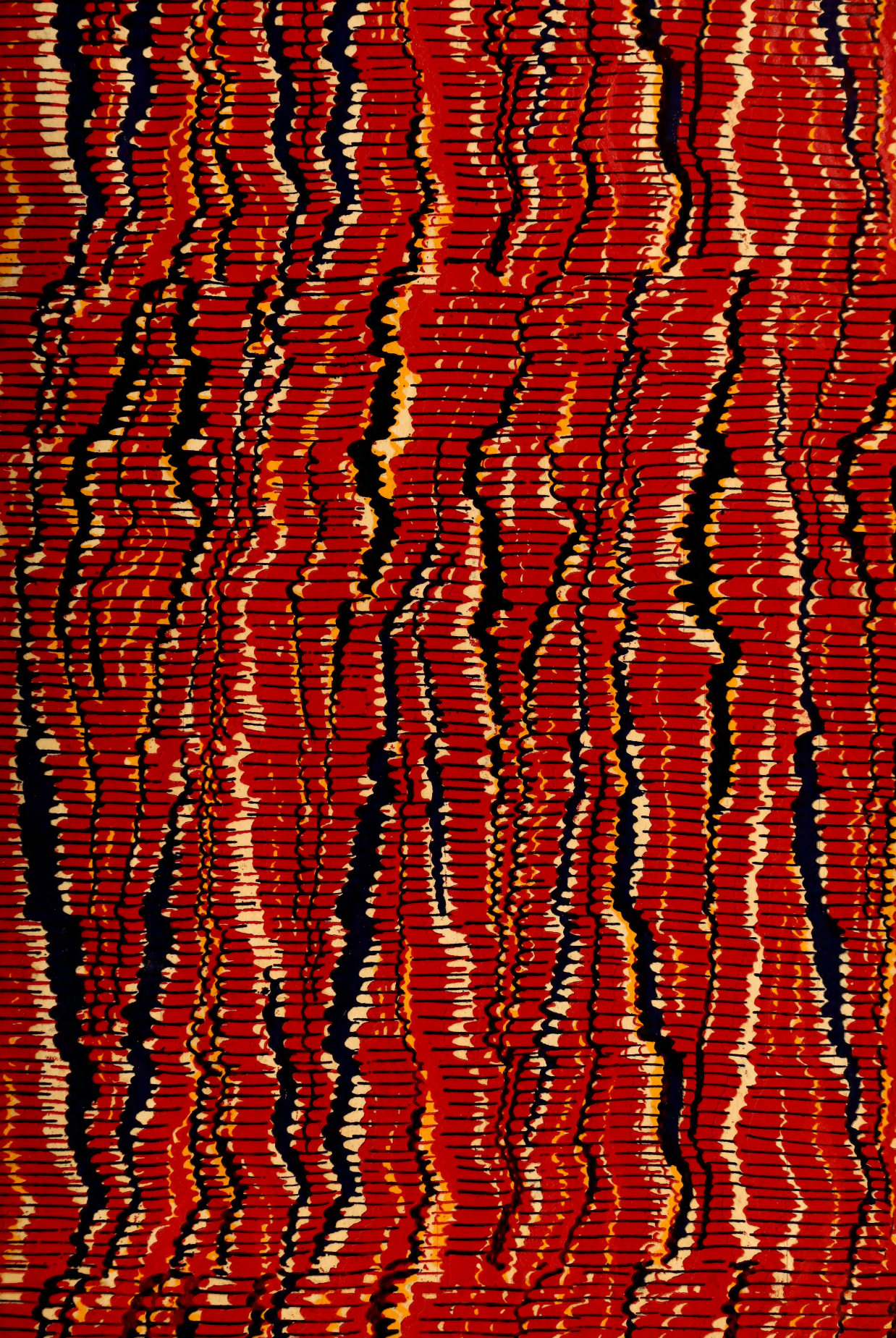

VOLUME XLII JULY-DEC., 1922

THE NATIONAL GEOGRAPHIC MAGAZINE

INDEX

27376

July to December, 1922

VOLUME XLII

PUBLISHED BY THE
NATIONAL GEOGRAPHIC SOCIETY
HUBBARD MEMORIAL HALL
WASHINGTON, D.C.

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WASHINGTON, D. C.
1923

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VOL. XLII, No. 1 WASHINGTON JULY, 1922

THE NATIONAL GEOGRAPHIC MAGAZINE

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CAMARGUE, THE COWBOY COUNTRY OF SOUTHERN FRANCE

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With Illustrations from Photographs by Clifton Adams, Staff Photographer, National Geographic Magazine

WHEN the Roman legions were encamped in Gaul the delta of the Rhône was the granary of the imperial armies. Today desert wastes and malarial swamps have so enveloped the Camargue that its dashing herdsmen and beautiful horsewomen have not yet fully rescued it.

Given over to herds of horses, cattle, and sheep, this cowboy land is little known, even by the people of France, although some of the most distinguished French men of letters have paid tribute to its simple folk.

At Arles the hitherto swift Rhône divides into two sluggish streams, whose floods, combined with the waves of the tideless Mediterranean, have built up an alluvial plain which is inherently rich, but which was despoiled by Louis XIV in much the same way that the fertile fields of Babylonia, ruined by Assyrian and Persian, became the desolation of modern Mesopotamia.

History clusters richly about the Camargue. Phœnician traders came hither to trade with the Ligurians even before the Greeks founded Marseille. When that port was threatened, appeal was made to the Romans, who thereupon invaded Gaul, and from the Provincia Romana, Provence gained its name. In the third century of the Christian era St. Trophimus established a church at Arles, which two centuries later became the capital of Gaul.

Then came the Visigoths and Ostrogoths to build Carcasonne, and the Franks, whom the Arabs later held in subjection until the advent of Charles Martel. Italy extended its power to the Rhône, and later the House of Barcelona added Camargue to its domain. Under Raymund of St. Gilles the people took so important a part in the First Crusade that the word "Provençal" came into common speech.

WHERE THE LANGUAGE OF THE TROUBADOURS DEVELOPED

With the fall of Rome the language of Cicero gave way to the vernacular of the slave, and this rude speech, passed on by word of mouth, not only triumphed over the Latin of the cloisters, but also developed into the rich language of the Troubadours.

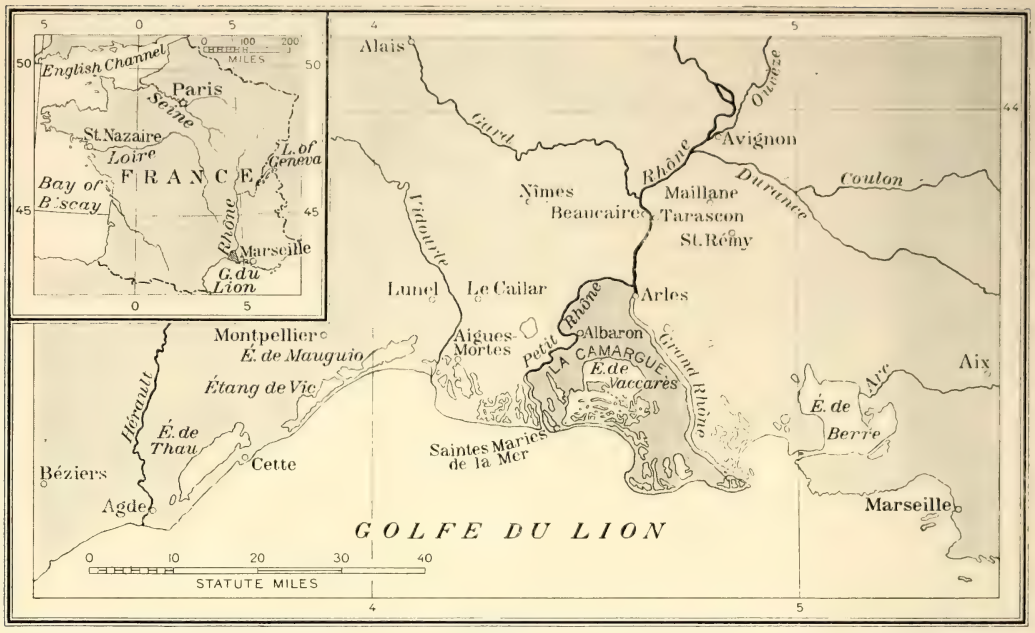
With the dispersal of the Albigenses came the unification of France, in which the geography of the north fought on the side of centralization, and the topography of the south, which fostered provincial pride, prevented such united strength as would avail against the kings of the north. Today, Camargue is a loyal part of the Republic, but proud of its own institutions and language.

Were it not for the intense pride and love of their home land on the part of

YOUNG COWBOYS OF CAMARGUE

In addition to the lariat of horsehair, their equipment includes a trident, which has many uses in handling the spirited cattle of the marshes.

A CAMARGUE FARMHOUSE WITH BARN AND DWELLING UNDER ONE ROOF, AND WITH WELL AND SMALLER OUTBUILDINGS NEAR BY



Drawn by James M. Darley

LA CAMARGUE, THE ISLAND "WILD WEST" OF SOUTHERN FRANCE

It lies between the two main arms of the River Rhône and is 26 miles long with a mean width of 11 miles.

the people of Provence and Languedoc, the Camargue might be given over to waste. But local patriotism, founded on poetry, horsemanship, and such love of the land as comes from outdoor life among the herds, is rehabilitating the region which once rivaled in richness the delta of the Nile.

IRRIGATION IS RECLAIMING THE DESERT

Now irrigation is making the desert blossom and the vineyards grow, and drainage is reclaiming the swampy wastes. Highroads have been constructed along elevated bunds, shaded by umbrella pines, and railways laid across the moor, thus opening up the Camargue to easy access from the outside world. But the customs and traditions of the land preserve the mellow flavor of the olden days when Vincèn visited Mirèio at the *mas* on Lotus Farm.

Among the clumps of scrubby tamarisks dotting the landscape like tiny islands on a dead-calm sea may be found a great variety of game. From all sides come flocks of sea-ravens, plovers, herons, and wild ducks of all sorts. On the shallow borders of the marsh stand lines of pink flamingoes. Sometimes a blue Egyptian ibis strays this way.

On the salt moor the rabbit multiplies as in Australia, in spite of the inroads made by the sportsmen, who are not forced to depend upon cap hunting, as was the mighty hunter Tartarin. Beavers which were numerous many years ago, are still found on the banks of the Rhône, and small land-tortoises are often seen.

When you have crossed the wonderfully fertile lands, where crops and vineyards grow, you enter the wild Camargue. It is a marshy plain reaching to the shores of the sea. Thereon is found the *sansouiro,* the salt moor, and what scanty vegetation may grow along these marshes.

The extraordinary feature of this wild section of France is the great herds of bulls and horses grazing peacefully, with flocks of sheep nibbling the scant grasses of the desolate moor.

THE MISTRAL, THE GREAT MUD-EATER

Camargue is a land of cloudless skies and a hot sun, sometimes dangerous in its intensity. But down from the cold central plateau of France there sweeps the mistral, a chilling wind which blows,

on an average, one day in every two. One might well picture Camargue as the setting for the well-known contest between the blustering wind and the genial sun, to see which could first force the traveler to remove his cloak.

The mistral's power is such that the roofs of the humbler homes and cowboy shelters hang low to withstand the force of the dry, cold wind, often cyclonic in power, and a cross is fixed to the wall as additional protection. But, cold as the mistral is, it is a blessing, for the malarial mosquitoes and miasmic vapors of the land cannot withstand its blasts, and the muddy morasses dry up before its cleansing breath. For this reason it is called the "great mud-eater."

The mistral is perhaps the main factor in the environment of the land; and, by a strange coincidence, a newer force which has influenced the region bears the same name. One might well call this part of Provence the land of the two mistrals. So simply and beautifully have the poems of Frédéric Mistral described the herdsman's land and life that one of them, *Mirèio,* won for him the Nobel prize for literature in 1904 and the lasting love of his people. Before the great poet of Provence died, in 1914, he had the satisfaction of knowing that his art had given new life to his land and new pride to its people.

A MOTHER'S TEARS INSPIRED THE REBIRTH OF A LANGUAGE

Frédéric Mistral had a great teacher, Joseph Roumanille, a gardener and poet, whose love of his native tongue was stirred by a trifling incident. Roumanille was once reading one of his own poems in French to some friends who were gathered in his home. Praise came to the lips of his fellow-artists, but to his mother's eyes came tears, because she could not understand this strange tongue, although she was a native of France.

Roumanille then decided to work for the reëstablishment of the language of the Troubadours. The finest flowering of modern Provençal is *Mirèio,* in which his pupil, Mistral, describes the simple country life and the love of a basket-weaver's son for the daughter of one of the rich farmers of Provence. Thus was the recent renaissance of Provençal literature mothered by a tear and sired by a song.

Mistral, thrilled by Homer and the Eclogues of Virgil, awakened anew the native speech of Provence, changed the provincial patois of St. Rémy into the proud Provençal of the Avignon School, mended the rifted lutes of the Troubadours and made their muted strings respond again to the rich sonority of the native tongue.

NATIVE DANCES, SPORTS, AND COSTUMES CONSERVED

Master of phrases that he was, Mistral was also a master of psychology. He saw dances, sports, and costumes as the unifying factors in a native life which was threatened by the melting pot of cosmopolitan civilization, and he sought in every way to conserve all such native elements as would make for happiness and patriotism, for race expression and for individual glory.

Hence when one watches the people of Camargue, gathered to witness bullfights in which the beast has an equal chance with the unarmed man, or sees the horsewomen dashing side by side with their husbands, fathers, and lovers in the *abrivado,* he is witnessing not alone a holiday spirit exulting in comradeship and excitement after the solitude of the endless plains, but also the fusing of a freedom-loving folk into a unit which has recently won official recognition from the France of which it is so unusual a part.

When the visitor gazes at the village maidens, whose colorful costumes add zest to the "Feast of the Virgins," he is noting one phase in a cultural renaissance whose importance cannot be realized until history has shown what fruit develops from this bright flower of beauty and unsophisticated charm.

THE CAMARGUE HERDSMAN

The herdsman of the Camargue is a picturesque figure. Living a lonely life among herds of black cattle and wild horses, he has developed the same manly traits that distinguish your Western cowboy. Courage, chivalry, determination, endurance—all are his. But individualism and self-reliance left small place for patriotism, and it was here that the poet hoped to round out the character of the fearless desert rider.

Hence the *rodeo,* or round-up, has become a cultural conference, during which

THE CAMARGUE COWBOY, HIS STEED AND HIS OUTFIT

When he rides the range on his faithful little white broncho, he carries a horsehair lariat in the bag over his shoulder. The trident, used for the wild bulls, is not necessary in handling horses.

THE EXCITING DASH OF THE "ABRIVADO": BRINGING THE BULLS FOR THE FIGHT

The Camargue has its own form of gantlet. The herders must drive the fighting bulls through the streets, while the townspeople do everything in their power to scatter the animals (see text, page 28).

THE BLACK HERDS OF THE CAMARGUE

In parts of Provence the pasturage is rich and a few cowboys, armed with tridents, can control a large herd. In other regions the sparse pasture demands more helpers to keep the ever-moving herds in order.

A REFUGE MADE OF REEDS AND THE HULL OF AN OLD BOAT, USED BY CUSTOMS OFFICERS AS A LOOKOUT POST, NEAR THE MOUTH OF THE LITTLE RHÔNE

the freedom-loving *gardians,* or herdsmen, impress upon themselves the mark of Provence while they brand their cattle with the initial or heraldic emblem which distinguishes their live stock.

The women have not been neglected in this plan to unite the people of Provence into a happy family of families. Their lovely dress has been revived and the fashion dictates of Paris repudiated in favor of a costume which was not only the costume of their mothers but which is beautiful in its own right.

THE "MAS," THE HOME OF THE PEOPLE

Before inspecting the *ferrade,* the *abrivado,* and the fight for the cockade, let us visit the *mas,* the farmhouse home of the Provençal herdsman. His interest is in his ranch and herds, but home means the more to him for all that. Nor is he ashamed to live under the same roof with his animals or harvest. The flavor of the soil permeates the very home life of the Camargue peasant.

Near the house one is sure to note the tree or trees which add distinction to the spot. Trees are few and far between in the Camargue. The graceful poplars, which add charm to more sheltered parts of Provence, are seldom found between the two main mouths of the Rhône, for such towering stateliness cannot withstand the unrelenting blasts of the mistral; but a clump of stout, low trees or somber cypresses is fostered by the farmers of the Camargue much as the solitary trees of Palestine are protected by the guardians of the holy tombs of the saints.

The rude well without a sweep, the creaking grindstone, the clutter of outworn tools, the peculiar spindle for making the *seden,* or horsehair lariat, the rickety ladder, the small stacks of coarse fodder—these are the homely features that surround the mas.

To an extent that is not common in cities, the mas is the true home of the people. In an inhospitable land, the home is the welcome retreat of host as well as stranger. The warm hearts and hearths of Camargue are ample compensation for the desolation of the outer world.

The welcome is no less sincere because the newcomer is himself an entertainer, who, grateful for the cheer which so surrounds him, warms to his happy task as guest and with each draught of wine radiates good will and confirms the host in his cordiality.

The genial host breathes the very air of hospitality, but his wife has also done her best to add a note of homelike charm to the scene. The plaster walls are hid behind great masses of wisteria or the deep blush of the Judas-tree. As in the windows of Russia's log houses, so here the humble geranium gives its bright touch of velvety color to the dusty scene and sweet-smelling beds of flowers triumph over the homely odors of the stable.

THE HOUSEWIFE'S REALM

The kitchen is the housewife's realm, a large bare room with the whitewash toned like an old meerschaum and the rough-hewn rafters browned by the smoke from the wood fire which blazes merrily below the large black kettle on its smoky chain.

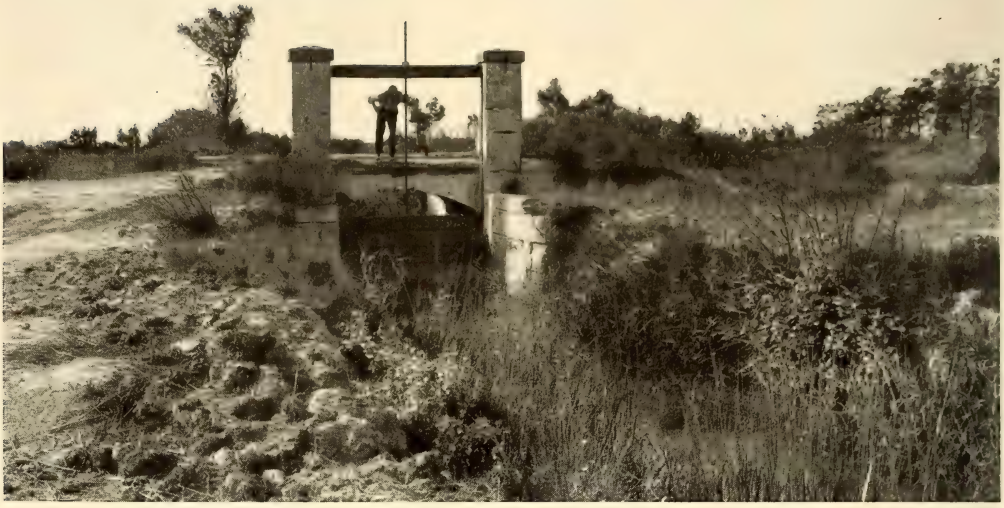
The great fireplace fills almost an entire side of the room, perhaps with a brick oven on one side and a masonry alcove for the few simple dishes on the other, while from the ceiling hang sprigs of drying herbs.

Here the humble housewife rules as queen, with a gay shawl about her shoulders and her high chignon, bound with black velvet and lace, taking the place of a crown (see page 16).

Primitive as are the arrangements, the cooking leaves nothing to be desired; for in the Camargue, where every one knows every one else, the virtues and failings of the people are retailed and rehearsed from one horn of the crescent that incloses the Étang de Vaccarès to the other, and lack of culinary skill would be as just a cause for feminine reproach as lack of courage to a man.

Just as Tartarin de Tarascon, whose delineation by Daudet makes sophisticated outsiders smile at his extravagances and envy him a little for his gruff leadership, so each herdsman has his reputation for skill, for strength, or for endurance, which gives him a justifiable pride of craft, and the culinary excellencies of his wife are equally well known.

The gardian of Camargue can be likened not only to the American cow-



A SLUICE-GATE IN THE CAMARGUE DRAINAGE SYSTEM

There is an extensive system of deep drainage ditches throughout the more fertile districts of the Camargue, and in the late winter and early spring the surplus rain water is drained off to the sea.

HELPING TO RESUSCITATE AGRICULTURE IN THE CAMARGUE

The herder's days are numbered here, as in many other parts of the world, and the pastoral life is giving way to the less romantic but more profitable occupation of agriculture. This is a return to the old order of things, for in the days of ancient Rome this part of Provincia Romana rivaled in fertility the delta of the Nile.

IRRIGATION MAY SOON MAKE THIS MONOTONOUS WASTE BLOOM

In traversing the Camargue desert south of the large expanse of water called the Pond of Vaccarès (see map, page 4), the seldom-used highway follows no fixed direction, but winds back and forth on the hard-packed sand.

A HAND-POWER BALING PRESS

With the return of irrigation and the adoption of modern methods, straw is coming into its own in the Camargue. This small baler requires only two men to operate it, and a more or less compact bale is turned out every few minutes.

EVEN COMMERCE IS NOMADIC IN CAMARGUE

In the town of Les Saintes Maries de la Mer the little stores and shops do not supply all the needs of the housewives, so traveling venders halt in the shade of the cathedral to display and sell their wares.

THE LURE OF THE READY-MADE

The Camargue is unusually self-reliant, but even in the tiny villages the fame of Marseille and Paris is not unknown, and when the itinerant vender arrives shopping is the order of the day.

THE HARD-BLOWING MISTRAL IS THE DRYER IN CAMARGUE'S OPEN-AIR LAUNDRIES

puncher, but also to the vaquero of Spain, to the gaucho of South American pampas, and to the rough riders of Australian stations or the South African veldt. He is, however, a special type, having more to do than protect cattle or horses. More than all else, the gardian is preserving the old traditions of the Camargue peasant, his customs, his melodious Provençal language, and something of his old-fashioned dress.

The gardian still wears a bright-colored shirt and a black coat lined with velvet. His trousers are of brown cloth, resembling leather, and are supported by a *taiolo,* a kind of large woolen belt several yards long.

In winter the gardian uses wooden sabots even when riding. Sometimes, as a protection against the cold wind and rain, he wears over his trousers high leggings made of calfskin and strapped to his belt. These leggings are similar to the American cow-puncher's "chaps." He also wears a wide-brimmed felt hat like the sombrero of the Western cowboy.

EVERY FAMILY HAS ITS APPRENTICE HERDSMAN

In nearly every family of herdsmen may be found an apprentice, or *gardia-noun,* chiefly distinguished by a passion for fighting cattle and a love of rough, open-air life.

Practicing with his father, uncles, or brothers, the boy soon becomes proficient in the cattle business. He must learn how to plait horsehair to make the seden or Camargue rope, and how to brand and wean the calves.

He must also learn to handle the long horseherd's staff and the gardian's iron trident, and follow the tracks of lost cattle over the wild salt moor.

To be a good herdsman he must know the different grass lands where the bulls and horses can graze and where to locate good holes at which to water them. Above all, the gardian must be a tireless horseman and rough rider, able to break the most unruly broncho to his will.

In winter the herdsmen live in the malarial marsh. When the great heat of summer hangs over the sun-burnt, dusty prairies they are ceaselessly tormented by swarms of mosquitoes, horseflies, and gnats.

Sober and inured to every hardship, they are patient and reserved, because of their solitary life among the cattle. That is why, at the religious festivals to which they drive their fighting bulls, they give

THE VILLAGE SMITHY OF LE CAILAR

HERE PRIDE OF CRAFT OUTLIVES THE COLOR OF ONE'S HAIR

The products of Monsieur Bonfort of Le Cailar have a hall-mark of their own. Here he is comparing a partly finished ficheiroun, or trident, with the carved walnut model into which a thousand tridents, scattered throughout the Camargue, would fit perfectly, although each one is forged by hand.

ALL CAMARGUE KNOWS HIS FAMOUS BRANDS

Monsieur Bonfort's tiny smithy is a favorite rendezvous of herdsmen. Whether it be to point a trident or form a cattle brand, this jolly blacksmith leads his field. Here he is putting the finishing touches on a cattle brand for a cattle king whose range lies far to the south.

vent to such surprising outbursts of boisterous gaiety.

THE GARDIAN'S TRIDENT

While mounted, the gardian uses a *ficheiroun,* or trident. This is a hand-forged piece of iron, of which the classic and ancient form is a half-moon with sharp horns and a third short, triangular point in the middle. This trident is helved on a staff seven feet long.

Gardians handle the ficheiroun with great cleverness. With it they throw down calves for branding or weaning, control unruly bulls, or stop a stampede in the herd, and on occasion protect themselves from attack. They also use the long staff in fording streams.

For these cowboys the trident is the emblem of free life. It has been employed as a theme for many Provençal poems and popular songs.

The poem of J. d'Arbaud is a familiar example: "O trident, arm of Provence—arm of captains and gardians—to preserve our old traditions, I hoist thee on thy staff of chestnut wood."

This trident of the cattle-herder might also stand as the emblem of the land, whose shape it so nearly resembles, for it is the mainstay of the gardian. About the new statue of Mistral's girlish heroine, in the Place Mistral of Les Saintes Maries de la Mer, is a low iron railing whose alternate prongs are trident heads (see illustration, page 22).

THE HERDSMAN'S HORSEHAIR LARIAT

While the sturdy ficheiroun is the rod and staff of the herdsman, of almost equal importance is the seden, a horsehair lariat, sometimes 36 feet in length, which is used as a lasso. It is never thrown from horseback, as it is light in weight and does not carry well in the air.

In making the seden, strands of horsehair are slowly spun from a rough bundle and tightly twisted by a heavy spindle, which is used in a horizontal position instead of hanging at the knee, as does the distaff of the spinners of the East.

The hair used in these sedens is carefully selected, not only for length and strength, but also for color. Strands of

MARIE, IN HER COSTUME OF OLD PROVENCE, BLOWS THE WOOD FIRE WITH THE OLD BELLOWS

In every farmhouse in the Camargue is a large, open fireplace in which most of the cooking for the family of the farm manager and the servants and laborers is done in old-fashioned utensils.

THE THRONE-ROOM OF THE CAMARGUE HOUSEWIFE

In the humble herder's home the kitchen is the heart of the house (see text, page 9).

THE CHARMING COSTUME OF THE ARLESIENNE HAS BEEN RESTORED TO FAVOR IN CAMARGUE

For a time there was danger of this lovely gown's being discarded for Parisian habiliments, but the wearing of the native costume has now become a point of pride, and this graceful belle of the Camargue looks as if she might have stepped down from some ancestral portrait gallery.

various colors are twisted into the final length, to form a pleasing pattern in white, brown, and black.

The projecting ends of horsehair give the seden a rough and fuzzy appearance, so that it does not look as if it would run freely in the noose. But the gardian handles it with ease and precision.

Seldom does the gardian carry firearms; but the Camargue is a great game country, and the owners of large estates, who trust their herds to unarmed cowboys, hire well-armed gamekeepers to protect the birds and wild rabbits (see p. 31).

Upon the wide webbing from which the gamekeeper's bag depends, there glistens a big brass badge, which serves as does the star of the constable in rural drama to identify him as "the law." His gun strap of plaited leather is a model of pliant strength.

THE DECEPTIVE CAMARGUE SADDLE MAY BE AN INSTRUMENT OF TORTURE

The cowboy saddle of the Camargue is as deceptive in appearance as is the meek-faced broncho. It looks like a deeply upholstered armchair perched upon a wide skirt of cowhide. One strongly suspects it of concealing a pair of shock-absorbers somewhere in its bulging sides.

Its high back is deeply padded and outlined with brass-headed nails in fancy designs. The wide curved pommel has no horn, but instead is tufted as luxuri ously as is the cantle.

A tenderfoot would imagine that on such a saddle one need only worry about how long his horse would last. But to one unaccustomed to so soft a seat the Camargue saddle can be an instrument of torture whose pleasing appearance gives little clue to its deadly effect. After one has ridden the desert wastes for a few miles, the novice pictures a broadly bulging hogshead as a comfortable seat and fears that his legs are bowed for life.

The large hand-made stirrups of wrought iron are much more comfortable, for they hang low and are covered over in front with iron bars, so that the foot cannot slide through and let the stirrup branches bruise the ankles (see page 6).

The hand-forged spurs are short, with small rowels. From the high saddle-bow hang two leather pockets and sometimes two *saquetouns,* or bright-colored cloth bags.

The Camargue bridle is generally made of black leather, without blinders, with a hand-forged bit having long curved branches. A sort of hackamore is used to break in a horse.

THE WOMEN RIDE HORSEBACK BEHIND THE MEN

Only on horseback does one traverse the wild waste of marshes.

The gardians' wives and daughters ride into the salt moor behind their husbands or fathers. They sit securely upon a little blanket bound to the crupper, and with an arm around their chevalier they ride great distances across the drab landscape.

From ancient times there have been in the Camargue horsewomen passionately fond of cattle-raising and of rough riding. In the sixteenth century mention was made by Pierre Quiqueran de Beaujeu of horsewomen accompanying the gardians during the *ferrade,* or cattle-branding.

A few years ago there was in the Camargue a very celebrated horsewoman, Mlle. de la Borse-Caumont. Her father owned the bulls and horses of Mas d'Icard. Gardians called her the "Damisello," the Miss, and almost worshiped her.

Nowadays, especially in Languedoc, the number of horsewomen is increasing. They ride astride white Camargue horses saddled in true cowboy style, wearing a girl's riding skirt, a shirt of some bright color, and a large sombrero.

They are very fond of the cattle business, follow the gardians at their daily tasks, and are always to be found in the thickest of the exciting charges of the abrivado.

THE VILLAGE SMITHY OF CAMARGUE'S CHEYENNE

One of the humble heroes of the Camargue would suit Longfellow better than Daudet. He is the village blacksmith of Le Cailar, the focus of gardian life, and the Cheyenne or Pendleton of Provence (see pages 14 and 15).

In his tiny smithy, this jolly Monsieur Bonfort fashions the tridents for his cowboy friends or forges the brands with which the roving herds are marked. None can design a finer pair of stirrups than he, and, with the modern encroachments of irrigation and agriculture, he will even mend a plowshare or make the

IN THE CAMARGUE THE FIGHTING BULL HAS HIS INNINGS

Between the sharp horns of the beast is fastened a bright cockade, which the young men seek to wrest away during the mad rush. Beyond a certain boundary, it is anybody's game, and the most bashful gardian may become famous overnight by securing the cockade of an especially famous bull.

irons for a rude cart. But it is the herder whom he really serves, and his fame stretches from the fortress-church of Les Saintes Maries de la Mer to the battlements of Aigues Mortes and the Roman arena at Nimes.

THE NACIOUN GARDIANO IS A COWBOYS' UNION

The "Nacioun Gardiano," a sort of cowboys' union, was organized to unite the lovers of the Camargue through pride of craft. In the Provencal festivals, it is the "Nacioun Gardiano" whose riders form parades and follow their leader, upon whose crimson banner are embroidered the golden cross of Languedoc and the mystic bark of the Holy Maries. From time to time these riders, some of them owners of vast herds, meet to play equestrian games.

The specific purpose of this group is the maintenance of the herdsmen's traditions, the perpetuation of the sports and customs of the past; but, above all, they foster the sweet speech of Provence and defend the traditions of the Camargue.

The righthand man of the gardian is the Camargue pony. Light gray in color and with a shaggy coat, the steed has a hang-dog air and an unkempt appearance. His low-hanging head, big and square, has sleepy eyes and a quiet expression. But never did a more disarming appearance camouflage a more satanic spirit. When mounted, this Rip Van Winkle among horses becomes spirited and full of the devil, half wild and with a savage temper.

THE CAMARGUE PONY HAS IRON ENDURANCE

Camargue horses are skittish and sly, and often they have a kick like the mule of Daudet's famous story, who treasured his animosity for seven years, and with one wallop transformed Tistet Vedene into a whirlwind of blond dust in which fluttered an ibis feather. They are seldom shod and live to a ripe old age. I have known good saddle-horses to be thirty years old.

Scientific men have searched in vain for an explanation of the origin of the

THE SPECTATORS FORM THE WALLS OF THE ARENA IN CAMARGUE BULL-FIGHTS

The mayor and the members of the city council of Le Cailar sit in a high gallery, but most of the spectators prefer ringside places. When the bull rushes his antagonists and charges toward the encircling crowds, it is a case of every man for himself.

Camargue pony. Some say he is descended from the Numidian horses brought over by the Roman cavalry; others ascribe his ancestry to the horses left in the Rhône delta by the Saracens. He resembles the long-haired horse of Tibet and the Siberian pony.

By a perfect adaptation to his environment, he has the same flat type of foot and hard hoof that distinguishes the horses of other marshy lands. He is bold, powerful, and sure of foot.

Rustic and sober in appearance, he has an iron endurance and is so self-reliant that he needs little care. When the rider dismounts after the day's work is done, the Camargue horse prefers to graze in freedom on the sparse moor rather than be well fed in a stable. The first time an outsider rides one he ascribes its ancestry to the hounds of hell. At the end of a month he feels like kissing his trustworthy little steed each time he parts from him.

Before the advent of the modern threshing-machine, the horses which run wild through the barren stretches of Camargue were employed to thresh wheat on the large farms of Provence and Languedoc. Sheaves were spread on the barn floor and the grain trodden out, as is still the custom in many parts of the world.

AMERICAN ARMY IN FRANCE USED CAMARGUE PONIES

Camargue horses are never employed in the French cavalry on account of their small size, but the American Expeditionary Force recognized their good qualities in war. When well broken and well trained, the Camargue horse is the cowboy's mainstay. He is the only mount with enough strength, suppleness, spirit, and stamina for rough riding on the barren ranges.

This independent little steed is not only a good worker, but, like his master, when a holiday comes, he delights in play. Trained as is a polo pony to take a full share in the sport, the Camargue cayuse measures up to the demands of the situation.

At *aiguillettes,* a contest in which the riders try to impale small wooden rings on their long wooden spears, the horse

A STATUE OF MIREILLE, HEROINE OF MISTRAL'S FAMOUS PROVENÇAL POEM

Although a purely imaginary creature, the central figure of *Mirèio* has had so great an influence on Camargue life that the town of Les Saintes Maries honors her with the same assumption of reality that Paris does Abelard and Heloise and Beaucaire does Aucassin and Nicolette. Around the statue is a railing in which the trident of the herdsman (page 15) figures.

shows a steadiness which is remarkable. In horse-racing he reveals unsuspected speed. But it is in the exciting game of *écharpes* that the Camargue pony revels.

Each of the two contending teams has six or eight riders, each wearing on the left arm three scarfs bearing the colors of his camp. The object is to tear the scarfs from one's opponent's arm before he can snatch yours. In the excitement of the match, the men center their attention on each other, and the ponies are depended upon to wheel and run to the best advantage. Often they are reluctant to cease their milling when the game is won, but seldom is the most spirited pony known to kick or bite in order to gain advantage.

'PUSS IN THE CORNER" ON HORSEBACK

Épervier is a glorified form of "Puss in the corner," played on horseback; and here, too, the ponies show an uncanny intelligence in dashing for the unoccupied spot at the blast of the bugle, and on finding another seeking the same base, outrunning him, or wheeling at full speed to occupy another position.

So spectacular are these equestrian sports that the ancient arenas of Arles and Nîmes today resound to the applause of the modern Provençals as they did eighteen centuries ago to the cheers of the provincials of Rome.

In these ancient amphitheaters, built by imperial Rome to spread content among a conquered people, Provençal games proclaim the fact that the joining of Provence and northern France was a union of equal with equal, rather than the cultural domination of one people by superiors.

CAMARGUE CATTLE ARE OF ASIATIC ORIGIN

Just as the shaggy horse of Camargue lacks the thoroughbred look, so the bulls lack the four-square beefiness for which a packer pays top prices. These cattle are of Asiatic origin, trained for speed rather than weight, and can outrun many horses. When gathered in herds they

are tractable, but when segregated they are hard to control.

Small in size because of the sparse pasturage, the Camargue bull's coat is black, with occasional reddish-brown tints. He has the face of a philosopher, thin and full of expression, with bright eyes. His horns are long and sharp, so mounted on his small head as to resemble a lyre without strings.

Formerly some of these rangy beasts were broken to the plow, but they do not fit the rôle of dumb, driven cattle, and their flesh is so tough and has so gamy a flavor that they are seldom killed for food. Nowadays they are only used for the Provençal mode of bull-fighting, of which the people are so fond.

In some parts of Camargue cattle-breeders cross the native stock with Andalusian fighting bulls. These cross-bred animals are used in the *corridas del muerte,* bull-fights of the Spanish type, which are given each year in the principal towns of the south of France. But the Camargue herdsman has his own excitement connected with his work as breeder and trainer of fighting stock.

A frequent pastoral task is that of cutting out a particular animal from the herd, changing a cow from one grazing place to another, separating a calf from its mother, or choosing the bulls for the next fight.

The *manado,* or herd, is surrounded and some riders circle it to keep it compact. Then the owner, followed by his herders, enters the group slowly, in order not to frighten the cattle.

MAIN STREET, LES SAINTES MARIES DE LA MER

It is paved with slippery granite and echoes all day long to the sound of wooden sabots.

First the leader-bull is cut out. That animal is usually of native stock, more obedient than the rest, partly tame, and trained to direct the actions of the other wild bulls and rally them when disbanded. A bell hangs from his neck and his wide horns have been cut off. He bears a sonorous name, for very often the gardians call to him to remind him of his duty as a leader. Sometimes they emphasize the hint by a cut of the trident on the croup.

The cowboy pony, perfectly trained, understands which animal he must follow. Spurred to a run, the horse begins the exciting chase, plunging on in the bull tracks, trotting, wheeling, stopping short,

A LIGHTHOUSE ON THE MARSHES OF SOUTHERN CAMARGUE

and dashing off at top speed. When the bull, separated from the herd and kept at a safe distance, is left to his own devices he stops, snorting and tossing his head, and some rider looks after him.

More difficult is the sorting of the other wild, sly animals. Once outside the herd, they often make such terrific dashes that the gardian cannot outride them, in spite of the fleetness of his steed. The beasts which are chosen out of the manado follow the leader-bull, and the gardians surround and drive them whereever they will. One cannot easily realize the suppleness, the quick decision, and the fleetness of foot which the gardians require from their steeds in this every-day but exciting task.

THE BRANDING FESTIVAL

But it is above all in the *ferrade,* or branding, that the gardians and their mounts show their greatest skill and alertness. This operation is performed in the spring of each year and consists in marking the young stock. Formerly all the *manadiers,* or owners, used the branding-iron for searing their initials or heraldic mark on the left flank of the bulls. Nowadays most of the owners prefer *escoussura*—that is to say, to split the ear of the bull in a manner peculiar to that particular herd.

The round-up has become a great holiday gathering, to which the manadier invites his friends and neighbors. Early in the morning carriages arrive filled with Provençales in their picturesque costumes, and amateur horsemen, who, on their white horses, equipped *à la gardiane,* come to aid the gardians in their work.

A suitable ground has been chosen in advance, a large level space with no obstructions. Close by, the gardians have assembled the herd. The carriages are arranged in a vast semicircle, forming an impenetrable barrier, and in the foreground a groove marks the boundary where the horsemen must stop in their chase.

In front of the carriages, filled with spectators, men and young folk on foot await, their eyes fixed on the herd. Over there one sees a young bull picked out and chased by the horsemen. It has leaped over the boundary and now belongs to the crowd on foot, who will try to secure it by running it down.

More venturesome than the others, a young man defies the young bull, which

THE EDIBLE SNAIL FLOURISHES IN THE CAMARGUE

A favorite feature in the gastronomic romances of the French and Italians, the edible snail, tradition says, was introduced into Britain by the Romans. This species is herbivorous and a great enemy of the gardener, but in the wild Camargue is welcomed by the herdsmen, for whom the *Helix pomatia* furnishes many a meal. The hat furnishes the yardstick by which to measure the size of the shells.

charges, and in a cloud of dust the man is bull-dogging the beast. Although thrown by the animal, he has succeeded in encircling its neck, and, tightening his hold, he brings it to earth amidst tremendous applause. Held immovable, the bull is marked. Then it scrambles to its feet, bellows, and joins the lowing herd.

Each young bull goes through the process of being muzzled, an operation which consists of placing in its nose a slab of wood called *museau,* shaped like a half-moon. The animal is free to graze, but the muzzle, falling down on its nose, prevents it from sucking. In time this slab of wood decays and falls off.

"THE FIGHT FOR THE COCKADE"

From the natural pastoral drama, the fight between man and beast incidental to branding, was developed the Provençal "fight for the cockade." The origin of this contest antedates the oldest traditions. It gratifies the passion of the Provençal and the Languedocian peasant for this peculiarly humane type of bull-fighting.

The Provençal fight for the cockade has nothing in common with the Spanish fight to the death, which has been celebrated for eighty years, with ceremonial pomp, in the arenas of Nimes, Arles, Marseille, Beaucaire, and Lunel.

In the villages the fights are staged in temporary inclosures formed of carts, barrels, and boxes. Formerly the seven animals used for the day's sport were always driven in by gardians. Now it is only in Languedoc that this picturesque custom is kept up, for in Provence the animals are brought to their bovine Olympic in special wagons.

It is to Le Cailar, about 12 miles from Nimes, or to the neighboring villages, that one must go to see an *abrivado,* the rapid charge of the gardians, taking the bulls to the local fight.

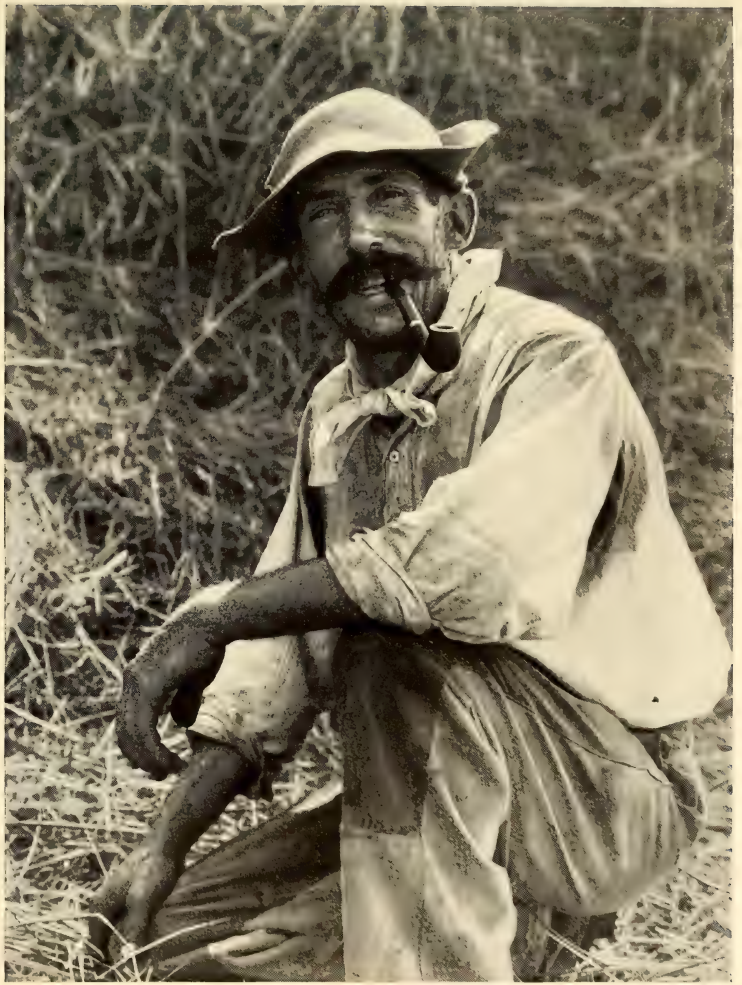
At daybreak the crowd gathers in the fields to eat, dance, and be amused by the snorting of the bulls.

BLESSING THE SEA AT LES SAINTES MARIES DE LA MER

Twice a year, in May and October, the peasants of Provence come to Les Saintes Maries and march with banners to the lonely shore where the sea is blessed for having given the Holy Maries of Calvary to the Camargue (see text, page 33).

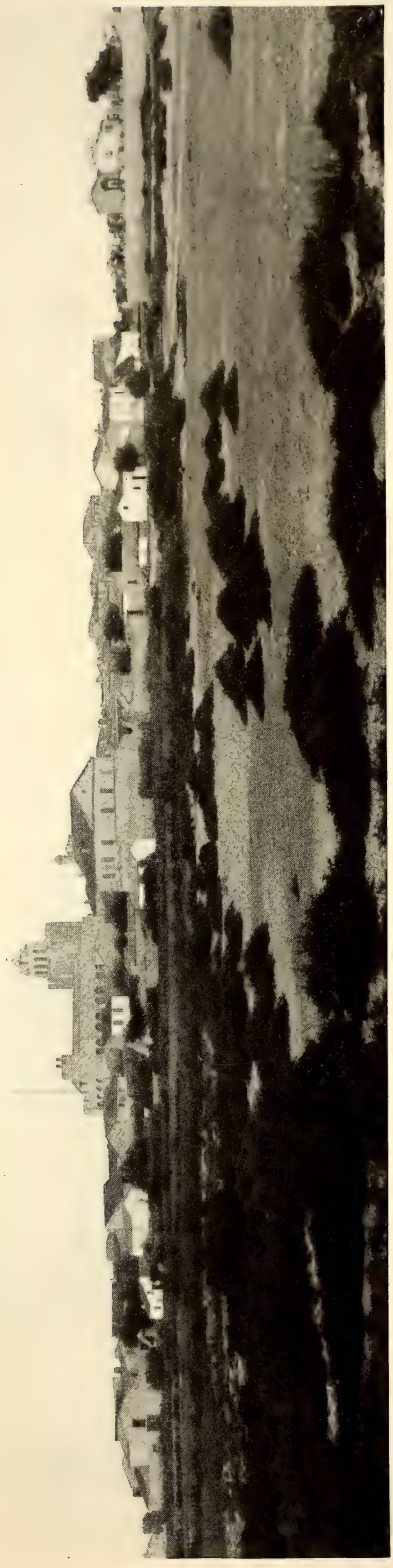
A GRANDMOTHER OF CAMARGUE

A high chignon, bound with black velvet and lightened with a touch of lace, forms the head-dress of the peasant women.



CONTENTMENT IN CAMARGUE

The farm laborer of this cattle country is an amiable citizen of few wants, and these easily satisfied.



WHERE TRADITION RAISED A VILLAGE ON THE SANDS

In former days the fortified cathedral at Saintes Maries de la Mer was the refuge of fisher folk when pirates descended upon the little town to pillage. An old document of 1323 says that at that time the cathedral was nearly two miles from the sea. Today it is only about 275 yards from the waters. In the churchyard are tying-posts for boats, which indicate that once the site was under water at times (see text, page 32).

Assisted by the gardians and amateur horsemen, the owner selects the bulls which are to make sport for the populace. Then, hedged in by the whole squadron of horsemen wearing gaily colored shirts, the animals go slowly toward the village. Behind them comes the long line of carriages filled with merry boys and girls.

THE DRIVE OF THE BULLS

At the outskirts of the village, groups of people, sticks in hand, wait, ready to spread disorder among the horsemen and give the frightened bulls a chance to escape. Their purpose is to stage an exciting spectacle and see the gardians chase the disbanded animals across the fields.

But the horsemen are on their guard. At a little distance from the entrance to the village, the white horses get closer to the bulls and all break into a gallop. Then, in a whirlwind of dust, amid cheers and vociferations, blows, shouts to the leader-bull, the thunderous orders of the manadier, and the whistling and applause of the crowd, a mad charge is made through the village street which leads to the *toril,* or stable, where the animals are to be confined.

Side by side ride the horsemen, hard pressed on both flanks, with stirrups interlocked. The horses, covered with sweat, resist with all their might the pressure of the mad bulls (see page 7).

In this charge, so full of rude sport, accidents often happen. Sometimes a half-wild horse takes fright at the shouting crowd and spreads disorder among his fellows. Another, though his hoofs are unshod, slips on the stones and takes his rider with him, or crushes a horseman against a wall.

It is an exciting game, full of unexpected incidents. Nothing stops the horsemen and horsewomen, who are always present in these wild rides through the gantlet of shouting people on foot.

The abrivado brings in sufficient bulls during the morning. The real sport takes place in the afternoon.

THE OBJECT OF THE CONTESTANTS IS TO SNATCH THE COCKADE

In a narrow stall, before the contest, a gardian attaches to the forelock of the beast a colored cockade poised between his deadly horns. It is this piece of ribbon that amateurs and professional gardians will endeavor to snatch off with the bare hands or with a steel hook shaped like a comb.

Each captured cockade brings with it a premium, a sum of money varying from a few francs to several hundred.

The arena is crowded with people; the spectators shout to one another, and in the heat of the afternoon the venders of oranges and refreshing drinks circulate among the people.

In the ring the cockade hunters wait, their eyes fixed on the gate of the toril. At a bugle call, it opens suddenly, allowing a black bull, blinded by the light, to enter. The bugle sounds a second time and the crier announces the prize which each cockade represents. Then the sport commences.

It is by the *razet* that the agile young man will endeavor to secure the cockade. This is a feint executed in front of the animal, on the flank, or behind him. Those employing this method are called *rasetaires*.

While the attention of the bull is elsewhere directed, the rasetaire advances in a wide circle. When a few yards from the animal, he attracts the animal's attention by shouting, and while the beast charges him, the man quickly thrusts his hand between the horns, endeavoring to detach the cockade with a quick upward motion. Then the man, successful or not, and followed by the bull, rushes to the barricade.

In order to execute this feint, one must have a sure eye, quick decision, and great agility. The slightest fault or hesitation may bring a wound to the rasetaire, some of whom are tossed on the horns of the bulls during these encounters.

The premiums attached to the cockades vary according to the qualities and savagery of the fighting bulls who are defending the ribbons.

These *cocardiers* should be valiant bulls, full of speed and tenacious in their pursuit of their adversary. They are especially trained for this purpose.

When a bull has finished its fight the leader-bull is sent into the ring to conduct it off to the stable.

Sometimes, to increase the excitement of the bull-fight, gardians arrange *l'esperage*, which consists of resisting with a trident the mad onslaught of a bull. Walking shoulder to shoulder, their tridents held firmly before them, two gardians advance across the arena. When the bull charges they must resist his assault unflinchingly by goading the beast on the muzzle.

Now the bull-fight is over and the bulls are waiting in the dark toril, some with the cockade intact between their dangerous horns.

The gardians are already mounted. Quickly the gate of the toril is opened. With rattling horns, the bulls bound behind the riders, while the people shout and yell. Spurring their steeds into a run, the gardians direct the mad rush of the beasts.

Now the village is far away, and the shouts and yells of the holiday crowds die away in the distance. In the darkness of advancing night the white steeds of the gardians have no need to direct the now quiet beasts to their grazing place. The last cultivated fields have been passed, and beyond the line of the silver-leafed willows, behind the mirror of a marsh, the herd is at home once more.

COW FIGHTS AT NIGHT FOLLOW THE DAY'S SPORT

Every day during the festival period it is the same. The herdsmen are on horseback a great part of the day to select and assemble and bring back the fighting cattle. In Languedoc, for instance, some villages have ten bull-fights on the festival of the local patron saint, and often people organize nightly fights with cows, which are very funny and not so dangerous.

"Bulls, bulls! Here come the bulls!"

Magic words, which make the Provençal people come running. Bull-fight and horse-play constitute the favorite games of the little boy when released from the school-room.

AN ORNATE SUCCESSOR TO THE HOMELY MAS, OR FARMHOUSE, OF CAMARGUE

Here formal gardens and a palatial dwelling have taken the place of the humble home of the Camargue peasant. In such a château every modern convenience is to be found, even an electric wine-press.

In the villages the cattle-owners and champion herdsmen are known by their Christian names and nicknames. The people cheer them and are proud and happy to be acquainted with them. These riders are kings of the country, for they bring happiness to all.

ARLESIAN WOMEN ARE NOTED BEAUTIES

Arlesian women have a reputation in the Midi as perfect beauties of the Greek type, descendants of the colonists who came hither in ancient times, and fit rivals of the lovely ladies of Georgia and Kashmir, with the same classic nose and fine features. Some of them have a Saracenic aspect, with olive complexions and long, dark, Arabic eyes.

But even their harmonious beauty is enhanced by the graceful old-fashioned Arlesian dress they wear. That costume, in the style of 1830, is still worn, in spite of "ready-mades" and Parisian fashions.

When fourteen years old the *chato,* or young Provençal girl, begins to dress her hair in the Provençal fashion and to wear the coveted styles of Arles. This day of costuming is a great holiday in the home. The girl dresses her hair in a high chignon, and around it she arranges a piece of fine old lace, tied with a black velvet ribbon, fluttering behind.

If the headdress is the most important article of the Arlesian toilet, the next is the white *capello,* a pleated muslin shawl, crossed over "her rounded bosom like a double peach, not ripe as yet."

Over that shawl she wears another, of printed calico, of the same color as the long, trailing gown. A long-sleeved bodice of black satin sets off the bright colors of the shawl and gown.

With Arlesian dress some jewelry is quite necessary. A long gold pin secures the velvet head-ribbon, a rich brooch closes the capello and heavy golden bracelets adorn the firm brown arms.

Ancient jewels are scarce and have been replaced by modern pieces, suggested by Provençal flowers and animals or by neo-Provençal literature. A trinket frequently seen is a locust, the symbol of Provençal poetry. Another is the seven-rayed golden star, the mark of the Féli-

bres, Mistral's colleagues in literature.

So attired in their Provençal costumes, the girls of the Camargue go to the festivals over the wide salt moor, mounted like fair Ellens on the strong white steeds of their brave Lochinvars.

MISTRAL SAVED THE OLD COSTUME

A quarter of a century ago, the fair Arlesiennes, fearing humiliation if they failed to follow the style dictates of Paris, gradually began to discard the far more lovely peasant dress. Mistral, who loved fine costumes as he did the muse, sought to retain for the Camargue the graceful dress of olden time. In 1903, just before he brought added fame to his beloved land by winning the Nobel prize in literature, the poet of Provence made a speech in which he felicitated the girls upon the beauty of their dress and begged them to perpetuate forever such a charming habit.

THE GAME-KEEPER OF A CAMARGUE ESTATE

The great brass plate on this keeper's breast advertises him to be "the law" and the keeper for M. Vitou's Mas de Pebre.

So was the *Festo Vierginenco,* or young girls' festival, established. In 1904 the same ceremony took place at a great popular meeting in the splendid ruins of the ancient Roman theater of Arles.

On a glorious Easter Monday there was a great parade of young Provençal girls in full dress, and the people were most enthusiastic over those who came from their moorland homes riding on horseback behind their knights of swamp and sage. It was a triumphal exhibition. The Arlesian people roundly praised the graceful procession of Provençal beauties and the return of the traditional costume. In 1899 Mistral created in the town of Arles a Provençal museum, called the Museon Arlaten. With the proceeds of the prize which *Mirèio* won for him, he added to the collection in the museum of Arles.

Here has been gathered an almost priceless exhibit of Provençal peasant art. There is also an important collection of old Provençal furniture, which is at once beautiful and perfectly adapted to the people's simple needs. One sees large cupboards and wardrobes made of carved oak, with high iron hinges, and the familiar decorated kneading-board and long-case clock.

WINDING HORSEHAIR TO MAKE THE SEDEN

The man is pulling out an even strand of horsehair from the bundle under his left arm. Some distance away to his right there is a spindle like that which rests against the box and which twists the even strand of hair into a small rope. This is in turn twisted with others to form the lariat of the gardian (see text, page 15).

Rooms have been arranged to represent in detail the life of Provence. One shows a traditional Christmas dinner in a gentleman farmer's living-room. Here has been gathered the ancient rustic earthernware, baskets such as Vincèn and his father wove, and everything typical of the rural life of Provence.

A special room is devoted to the cowboy life in Camargue. It is decorated with the homely objects and implements of the pastoral life.

Proud as the people are of their finery, there is nothing effeminate about the Camargue. Courage and chivalry are native to the soil.

THE LANDING OF THE HOLY MARIES OF THE SEA

Home of supple cowboys, whose feats of daring rival those of the toreador of Spain or neighboring Nimes, Camargue's wider reputation rests upon a religious legend, whose holy personages saved the sand-dunes from oblivion and gave them a lasting merit as the landing place of the Holy Maries of the Sea, exiled from the Holy Land to unfamiliar scenes, upon which, when they died, the mantle of their holiness fell; so that to this day the lame walk and the sick are healed through pilgrimage to their shrine.

On a spit of land so low that in the churchyard there are tying-posts for boats like those beside the Grand Canal at Venice, there stands the fortress-church to which *ex voto* offerings have come from kings and fishermen. Just beyond, spearing the sky with towers which make the ancient steepled roofs seem low, rise the standards of wireless aërials.

Among the marshes and the vast wastes of salt moor, where only saltwort grows, lies this little fishing village of Saintes Maries de la Mer. Its red-tiled cottages border the blue Mediterranean and nestle against the fortified walls of the cathedral.

Saintes Maries de la Mer, or "Li Santo," as the people often call it, is the lodestone that attracts each year many pilgrims from Provence and Languedoc. A legend told in this quaint village relates

PLAYING BESIDE THE PLYMOUTH ROCK OF CAMARGUE

In the Place Mistral, in Les Saintes Maries de la Mer, there is an antique cross which commemorates the landing of the mystic pilgrims who came hither from Calvary (see text, page 32).

that after the death of Christ the Jews seized Lazarus, Mary Magdalene, Mary Jacobee, the mother of St. James the Less, and Mary Salome, the mother of James and John. They were left in the care of an Egyptian servant and cast adrift in a disabled boat, from which they were shipwrecked on the sands of Camargue.

The spot at which the holy women landed became the site of the village of Les Saintes Maries, and it is said that they proceeded from this place to evangelize the southern part of Gaul, whence they eventually returned to die.

AN UNKNOWN PRINCE BUILT THE FORTIFIED CATHEDRAL

Many years later an unknown prince built on the same spot a fortified cathedral in honor of the sacred visitation and provided therein a receptacle for the safe keeping of the sacred relics. This cathedral was the scene of many fierce attacks during the invasion of Gaul by the Saracens.

At the time of the annual pilgrimage the reliquaries, which have been kept in the high chapel above the church floor, are lowered to the chancel. The following day, along the beach, a procession may be seen with pilgrims bearing at its head a flowered stretcher on which rests a miniature boat containing statues of the three Marys. Then from a fishing-boat the priest blesses the blue sea which gave them to Camargue.

THE MYSTERIOUS GITANOS ARRIVE IN MAY

In the month of May one meets at Saintes Maries de la Mer nomad tribes, often erroneously called Bohemians. In Austria they are called Tziganes; in Germany, Zigeunern; in Italy, Zingari; in England, Gypsies; in Spain, Gitanos; in the south of France, Caraques or Carai. They call themselves the Gitanos and speak a language crammed with strange words which are not connected with any other known tongue. They have nothing in common with ordinary tramps.

The Gitanos are tall and broad-shouldered, with sunburnt complexions, curly hair, and soft black eyes. The women

have a wild beauty and are very jealous of their genealogy. They marry only among their own people.

These nomad tribes live away from civilization, always wandering, proud and free. They never settle down and their house is the moving "roulotte." Horse-dealing is their usual vocation, and they are excellent judges of horseflesh.

At least once in their lifetime these raggle-taggle Gypsies, scattered all over Europe, proceed toward this wild section of France to worship a Christian saint, their patron, Saint Sara, the Egyptian.

The Gitanos take no interest in the Christian ceremonies. During the pilgrimage they remain in the crypt of the church, which is specially reserved for them. There they sit, holding huge wax tapers in their hands, worshiping and singing. No stranger is allowed to be present at their mysterious ceremonies, which are followed by the coronation of the Gypsy king and queen.

On the 25th of May in the pilgrim procession, the Gitanos are accustomed to carry on their shoulders a little flowered boat containing the wooden statue of Saint Sara, which they crown on the sandy beach, shouting "Vive, Sainte Sara"!

Then these nomad tribes leave, to resume their lonely wanderings.

THEIR ORIGIN IS A FASCINATING MYSTERY

The mysterious origin of this people has ever been a fascinating problem and has also been the favorite study of many scientists and writers, but unfortunately not all the explanatory theories propounded are substantiated by scientific data.

Some say the Gitanos may be the last survivors of a forgotten Egyptian or Assyrian civilization. Others, struck by certain similarities which they have in common with the Basque people, think they were the first Iberians. Others attribute to them an Indian origin, picture them driven westward by Oriental irruptions and identify the Gitan language with that of an Indian tribe of Sindh.

But the boldest and most curious theory is one which has been advanced after careful consideration and numerous observations of their customs, language, and ethnical characteristics.

According to Gitan legends and traditions that have been handed down from father to son and from tribe to tribe, there was a large land without a shore which was inhabited ages ago by the first Gitan people, but which disappeared one day in an overwhelming disaster.

Are these legendary lands the lost Atlantis? And did any of its inhabitants outlive the cataclysm? Was this fabulous country the birthplace of the first Basques, Gitans, and American Indians?

Marquis de Baroncelli, who has long studied the vexing question, has noted the strange likeness of the ethnical characteristics of the Red Skin and the Gitan. He has also been much surprised by some customs common to both races, such as the simple action of inspecting the teeth of a horse.

He noticed the curious answers to the question, "Whence did your people come?"

"From where the sun rises," says the Indian. "From the sunset land," say the Gitanos.

These speculations are strengthened by sayings of Gitanos who take part in the pilgrimage to "Li Santo."

A snowy-bearded Gypsy patriarch said: "We are to the human race what the Camargue horse is to his—the sole survivors of a vanished world."

On April 26, Mr. A. W. Cutler, of Rose Hill House, Worcester, England, died in Cava dei Tirreni, southern Italy, while making for the National Geographic Magazine a photographic survey of the scenery and peasant types of Calabria. Many of Mr. Cutler's superb photographic studies have appeared in The Geographic during the last nine years, and only a few months ago he completed for it a remarkable collection of pictures in Portugal. He had expected to make similar photographic series in Greece, Morocco, and Japan upon the conclusion of his labors in Italy. The members of the National Geographic Society will learn with profound appreciation that this gifted photographic artist has left as a bequest to The Society his entire collection of negatives, the result of a life work in many parts of the world—a truly notable gift toward the humanizing of geography.

MIDSUMMER WILD FLOWERS

IN THE following pages THE GEOGRAPHIC offers another series of biographies and exquisite illustrations in their natural colors of some of the familiar wild flowers of America.

The several series published previously have included "American Wild Flowers," with twenty-nine biographies and illustrations in color, in May, 1915; "Common American Wild Flowers," with seventeen biographies and illustrations in color, in June, 1916; "Our State Flowers: Floral Emblems Chosen by the Commonwealths," with thirty biographies and illustrations in color, in June, 1917; "American Berries of Hill, Dale, and Wayside," with twenty-eight biographies and illustrations in color, in February, 1919; and "Familiar Grasses and Their Flowers," with eight biographies and illustrations in color, in June, 1921.

Most of the thirty-eight species of flowers illustrated in the accompanying series will be found in bloom throughout the United States during July and August. Their beauty will command the admiration of passers-by, while the variations in their structure and the provisions which Nature has made for their propagation will accentuate anew for the student Wordsworth's famous aphorism in tribute to "the meanest flower that blows."

NATURE PROTECTS HER OWN

In one of the earlier flower series the Editor emphasized the danger of exterminating some of our wild flowers by indiscriminate gathering. Happily, Nature has made such ample provision for the reproduction of the flowers discussed in this series that only five of the number require protection—the Bluebell (Plate XIV), the Rosemallow (Plate VIII), the Sheep Laurel (Plate VII), the Fringed Orchid and the Water Avens (Plate VI), and Spiderwort or Widow's Tears (Plate IV). All the others may be gathered whenever and wherever found without danger of robbing future generations of their loveliness.

These beautiful illustrations, costing $25,000, are reproductions from paintings made by the gifted artist-naturalist, Miss Mary E. Eaton, of the New York Botanical Gardens, who has preserved to a remarkable degree the color, form, and grace of the specimens here presented.

Additional flower series are in preparation and will be published in THE GEOGRAPHIC subsequently.

It will be noticed that in some cases the names of plants in the text do not exactly agree with those on the plates. This is due to the fact that the text material could be prepared after the adoption of the Official Catalogue of Standardized Plant Names, a monumental work compiled by the American Committee on Horticultural Nomenclature, designed as a sane and workable harmonization of the present confusion in every-day plant names. The plates had to be sent to press before this standardized nomenclature was adopted. In the cases where changes have been made both the new and old designations are given in the text.

AMERICAN WATERLILY

Castalia odorata (Dryand.) W. & W.
[Plate I]

This beautiful inhabitant of ponds and streams belongs to a family of water-loving plants famous in many parts of the world. It is a cousin of the lotus of Egypt and of the sacred lotus of India. Also it claims relationship with the gigantic *Victoria regia*, the queen of floral aquatics, whose leaves are often seven feet in diameter and whose flowers are frequently fifty inches in circumference.

The range of this fragrant species is from Nova Scotia to the Gulf of Mexico and from the Atlantic Ocean to the Mississippi River. Its preferred habitat is still water, such as ponds, shallow lakes, and slow streams. It begins flowering in June and continues to put forth blossoms until touched by frost.

Its leaves, dark green above, pinkish on the under side, and somewhat heart-shaped, float on the water. The solitary flower, pure white or pink tinged, deliciously fragrant, and often five inches in diameter, opens shortly after sunrise, spreading a bounteous feast for bees, flower-flies, beetles, and "skippers."

This blossom affords a striking picture of one phase of plant evolution. As the ages passed, the waterlily found what most business houses learn sooner or later, that it pays to advertise. What good were its numerous pollen-producing stamens if the insect buyers failed to come and carry away the pollen to fertilize other flowers? Therefore many of the stamens were gradually transformed into petals, through natural processes, with the result that now, having intelligence of its wares published to the four winds, no pollen-dispensing establishment is busier than the American waterlily when the insect hosts are a-wing.

The stamens and pistils of the scented water-lily mature at different times, thus insuring cross-fertilization.

SHEEP SORREL

Rumex acetosella L. [Plate II, left]

The sheep sorrel is another of the plant world immigrants to America that deserves deportation as an undesirable alien; but, like the English sparrows of the feathery kingdom, it fights its way into every community by its fecundity. Rivers, mountains, quarantines, every barrier that nature or man has set up against it, has been overridden. Even the Rockies, which have stood as a wall of adamant against the serried hosts of most westward-bound floral invasions, have been too low to keep the sheep sorrel in check; so that it is found from ocean to ocean and from Canada to Mexico.

The plant by some is known as field sorrel and by others as sour grass. It invades hay and pasture fields and crowds out the valuable grasses. Likewise, it disputes with the new-sown winter wheat for control of ground on which it has secured a foothold. Only the most persistent harrowing of the ground before seeding time will hold it in check until the wheat can come up and grow strong enough for the fray with the hardy foe.

The sheep sorrel is a member of the buckwheat family. Among its cousins are the buckwheats, the docks, the knot-weeds, the smartweeds and the tear-thumbs. It grows from six to twelve inches tall and when mature gives the field which it has colonized a real sorrel-top appearance.

ENGLISH PLANTAIN

Plantago lanceolata L. [Plate II, right]

Like the charlock, corn cockle, and the sheep sorrel, the English plantain is an alien which came to our shores as a stowaway and has made America its own. It has sundry names in divers localities, such as ribgrass, narrow plantain, and ripple-grass. It blossoms from June to September and fights stubbornly for position in both field and lawn. Its seeds mature about the same time as clover seed, and it is indeed a "tare among the wheat" when the farmer wants to sow his clover.

The English plantain places its homely cone of greenish buds on a tall grooved stem. These buds mature as brownish flowers, so minute as to be almost indistinguishable. The ones at the bottom open first, and then the procession moves up the cone, day by day, until each row of flowers has taken its turn at blooming. These flowers possess long-extending anthers mounted on filamentous stamens, and they float around the cone as the rings of Saturn around the planet. In the illustration one may see the cones at the various stages.

BLUE VERVAIN

Verbena hastata L. [Plate III, left]

Growing from four to six feet tall, with its flowering spikes branching upward like the arms of a candelabra, the blue vervain, whose flowers are more purple and violet than blue, possesses a range as wide as any other plant species in America, almost the entire United States and Canada being home soil to it. Wild hyssop and simpler's joy are other names for it.

One always regrets that *Verbena hastata* has a way of maturing the blossoms on each spike a few at a time instead of all at once, for seeds at the bottom of the spike, flowers in the middle, and buds at the top do not produce the pretty effect that a spike full of flowers would. The late John Burroughs, who could always be relied on to find beauty in any flower that possessed a trace of it, wrote of its drooping knotty threads as making "pretty etching upon the winter snow."

The blue vervain is a favorite with the bumblebees, which, with many other members of the bee family and the bee-like fly species, gather at its festal board.

It borrowed its name, simpler's joy, from a European sister, and has also appropriated many of the latter's traditions and much of its folklore. No plant that the herb-gatherer could find was more salable than the vervain; hence none brought so much joy to the simple peasant.

The vervain is known abroad as the holy herb, and was one of the plants sacred to the Druids of England. Likewise, it was held sacred to Thor, the God of Thunder, and was supposed to exert a peculiar influence upon the eyesight. It is said to have been found growing on Mt. Calvary, and is reputed, in the folklore of Europe, to stimulate affection and to be able to break the power of witches.

PICKERELWEED

Pontederia cordata L. [Plate III, right]

The pickerelweed is one of the members of the plant kingdom that insists upon making its home in the water, usually preferring the shallow waters of a stagnant pond.

It is a tall plant, with one blunt, arrow-head-shaped leaf, varying to a very elongated triangle. Above this leaf rises a spike about four inches long, from which issue numerous more or less irregular ephemeral, violet-blue flowers, each marked with a distinct yellow-green spot.

That ever-delightful biographer of the folk of Nature's garden, Neltje Blanchan, called the pickerelweed a vigorous wader, a sort of floral crane, and reminds us that in the backwoods people think that this plant is the favored resort of the pickerel when she deposits her eggs.

A botanist who made a careful study of *Pontederia cordata* says that its flowers occur in three forms, not on the same, but on different plants, excelling even the purple loosestrife in the striking type of its dimorphism.

Unable to set seed without insect aid, they resort to what seems little short of marvelous tactics to get the maximum benefit out of the visits of their winged guests. In one type of flower the stigma is raised on a long style to the very top of the blossom; in the second type the stigma comes half way up the flower cup; in the third type it remains at the bottom.

Sweet-Scented White Water Lily
Castalia odorata (*Ait.*)
Water Lily Family

Sheep Sorrel
Sour Grass
Rumex acetosella (*L.*)
Buckwheat Family

English Plantain
Rib Grass Narrow Plantain
Ripple Grass
Plantago lanceolata (*L.*)
Plantain Family

Blue Vervain
Simpler's Joy Holy Herb
Wild Hyssop
Verbena hastata (*L.*)
Vervain Family

Pickerel-Weed
Pontederia cordata (*L.*)
Pickerel-Weed Family

Bottle or Closed Gentian
Gentiana andrewsii (*Griseb.*)
Gentian Family

Larger or Hyssop Skullcap
Scutellaria integrifolia (*L.*)
Mint Family

Spiderwort
Widow's or Job's Tears
Tradescantia virginiana (*L.*)
Spiderwort Family

GOLDEN ST. JOHN'S-WORT
Hypericum aureum (*Bartr.*)
St. John's-Wort Family

PRICKLY POPPY
Argemone mexicana (*L.*)
Poppy Family

YELLOW FRINGED ORCHIS
Habenaria ciliaris (*L.*) *R. Br.*
Orchis Family

STIFF YELLOW FLAX
Linum medium (*Planch.*) *Britton*
Flax Family

PURPLE OR WATER AVENS
Geum rivale (*L.*)
Rose Family

Corn Cockle
Agrostemma githago (*L.*)
Pink Family

Sheep Laurel or Lambkill
Kalmai angustifolia (*L.*)
Heath Family

Blazing Star
Colic Root — Rattlesnake Master
Gay Feather — Button Snakeroot
Liatris squarrosa (*Willd.*)
Composite Family

PURPLE BERGAMOT
Monarda media (*Willd.*)
Mint Family

HAIRY BEARD TONGUE
Pentstemon hirsutus (*L.*) *Willd.*
Figwort Family

CRIMSON-EYED ROSE-MALLOW
Hibiscus oculiroseus (*Britton.*)
Mallow Family

Beach Pea
Everlasting Pea
Lathyrus maritimus (*L.*) *Bigel.*
Pulse Family

Common Milkweed
Asclepias syriaca (*L.*)
Milkweed Family

Sweet Scented Shrub
Calycanthus floridus (*L.*)
Calycanthus Family

Pokeweed
Phytolacca decandra (*L.*)
Pokeweed Family

Clammy Ground Cherry
Physalis heterophylla (*Nees.*)
Nightshade Family

Charlock or Field Mustard
Brassica arvensis (*L.*) *Ktze.*
Mustard Family

MIST-FLOWER
Eupatorium coelestinum (*L.*)
Composite Family

PINK CORYDALIS
Capnoides sempervirens (*L.*) *Pers.*
Fumitory Family

NEW YORK ASTER
Willow-Leaved Aster
Aster novi-belgii (*L.*)
Composite Family

TURTLE-HEAD

Snake Head
Shell Flower
Cod Head
Balmony

Chelone glabra (*L.*)

Figwort Family

TEASEL

Dipsacus sylvestris (*Huds.*)

Teasel Family

VENUS'S LOOKING-GLASS
Specularia perfoliata (*L.*) *A. DC.*
Bluebell Family

FERNLEAF FALSE FOXGLOVE
Aureolaria pedicularia (*L.*) *Raf.*
Figwort Family

BLUEBELL
Harebell Ladies' Thimble
Witch's Thimble
Campanula rotundifolia (*L.*)
Bluebell Family

TANSY OR BITTER BUTTON
Tanacetum vulgare (*L.*)
Composite Family

EASTERN SILVERY ASTER
Aster concolor (*L.*)
Composite Family

EARLY GOLDENROD
Solidago juncea (*Ait.*)
Composite Family

Orange Milkwort
Wild Bachelor's Button
Polygala lutea (*L.*)
Milkwort Family

Common Dodder
Love Vine Angel's Hair
Cuscuta gronovii (*Willd.*)
Convolvulus Family

Each flower has two sets of stamens, and the length of these is always adjusted to the height of the pistil.

Whenever the pistil is high the stamens keep out of its way by occupying the lower and middle position. If the pistil is low they occupy the middle and high positions. When it is medium they occupy the low and high positions.

The result is that when the bee comes to gather nectar he gets his abdomen dusted with the pollen of the long stamens, his chest with that of the middle ones, and his head with that of the short ones. In this way he always carries the short stamens' pollen to the low pistils of other flowers, the long stamens' pollen to the high pistils, etc. This is necessary to cross fertilization. Darwin proved that only the long stamens' pollen would fertilize the high pistils, etc.

The pickerelweed's range covers the eastern half of the United States and Canada and its flowering season is from June to October.

CLOSED OR BOTTLE GENTIAN

Gentiana andrewsii Griseb. [Plate IV, left]

This member of the gentian family is the commonest of all its tribe in the East. It is remarkable for its tight-closed, bottle-shaped flowers of a blue that approaches ultramarine in intensity. Thoreau spoke of its "transcendent blue, light in the shade and turning purple with age." Occasionally some degenerate plant raises a crop of white flowers.

There is, perhaps, no other plant better fitted for late appearance than the closed gentian. It blooms only a few weeks ahead of Jack Frost, when short days and chilly nights discourage most of the flowers, and the deep-tinted blossoms hold themselves firmly closed, as though to protect the delicate stamens and pistils of its reproductive system from the sharp touches of the late year.

The bumblebee knows that the closed gentian has prepared a feast for his special delectation. This is a cup of nectar denied to the rabble by the flower's tightly closed doors and supplied to the bumblebee, which forces its way into the closed corolla. The flower dusts the bee with pollen while it sits at her table, and the insect carries this to its next host.

The favored haunts of the closed gentian are along the edges of rich woodlands, and its range is from Maine to South Dakota and from Georgia to Missouri.

HYSSOP SKULLCAP

Scutellaria integrifolia L. [Plate IV, middle]

Belonging to the versatile mint family, which includes such diverse denizens of field and forest as blue curls, wood sage, horse balm, bugleweed, horehound, pennyroyal, wild bergamot, gill-over-the-ground, self-heal, false dragon head, and catnip, the hyssop skullcap is at once beautiful and unpretentious.

Blooming from May to August over a range that reaches from southern New England to eastern Texas, this species of skullcap seldom grows taller than two feet, with the result that its fine colors are often hidden by surrounding vegetation. The leaves, like the stem, are covered with fine down. Its bright blue flowers are about an inch long.

VIRGINIA SPIDERWORT

Tradescantia virginiana L. [Plate IV, right]

The spiderwort, which is a cousin of the wandering jew and the Virginia day-flower, rejoices in the lacrymose every-day name of widow's tears.

Like its cousin, the day-flower, the spiderwort opens for only a brief time—the morning hours. Then the flowers are bright and lively enough for any company, but as the sun sweeps down the westward sky the petals begin to retreat into the calyx, and presently there is a thin jelly where a while ago was a flower. "Dissolved in tears," one might say, was the fate of the morning's blue petals surrounding the golden anthers.

The spiderwort is cross-fertilized by the bumblebees, which are attracted by an abundance of pollen. Bumblebees seem to be attracted by blue and purplish flowers as strongly as bargain-hunters are drawn to the red trimmings of ten-cent stores.

The botanical name of the spiderwort is in memory of John Tradescant, gardener to Charles I. A relative sent him some spiderwort seeds which he planted at Hampton Court. Since that time the Virginia spiderwort has been a well-known garden flower in England.

The range of the spiderwort extends from Maine to South Carolina and westward to the Rocky Mountains. Its habitat is rich, moist ground.

GOLDEN ST. JOHN'S-WORT

Hypericum aureum Bartr. [Plate V, left]

The St. John's-wort family is small, being made up of shrubs and herbs ranging from St. Andrew's Cross to orange-grass.

There is no member of the family with a better claim to beauty than the subject of this sketch. With its drooping petals, its host of stamens, and its united pistils, the blossom of the golden St. John's-wort is admittedly a beautiful flower. It flourishes in the Southern and Western States.

The plant is a shrub that attains a height of three feet, more woody than most species of St. John's-wort, and often appearing of globular shape, like a miniature tree. It has a red bark that gradually cleaves off in thin layers. Wild, it prefers rocky situations and shady spots where moisture is longest retained. Cultivated, it grows from cuttings or from seeds, the seed-grown ones blooming the second year.

PRICKLEPOPPY

Argemone mexicana L. [Plate V, right]

This thorny terror of the barefoot boy is an immigrant from Mexico, but it makes itself thoroughly at home as far north as New Eng-

land. It was brought to the United States as a flower, but promptly broke out of captivity and since has been rated as an escape. It prefers to share the haunts of men, and roadsides, old orchards, and meadows that have not been touched by the plow for a long time are its favorite habitats. Its prickly leaves are as sharp-pointed as needles and its stem is covered with "stickers."

The flowers are usually two inches broad or more, with four to six yellow petals and numerous golden stamens. Like other poppies, *Argemone* has no nectar to offer the bees, but it does have plenty of pollen to give them, and they come to it in large numbers. Cross-fertilization is accomplished with the help of the insect visitors. The fruit capsules are nearly an inch long and are well armed with spines.

The pricklepoppy has many interesting relatives, among them the bloodroot and the celandine.

YELLOW FRINGED ORCHID

Habenaria ciliaris (L.) R. Br. [Plate VI, left]

Cousin of the ladyslipper, the moccasin-flowers, the ladies-tresses, the rattlesnake plantains, the twayblades, and the puttyroots, the yellow fringed orchid belongs to a family that has some six thousand different species grouped in about four hundred genera. Not even the grasses can boast of a greater family tree than this.

This orchid, a perennial, has an ingenious mechanical device to insure cross-fertilization. Its nectar is concealed in a tube so narrow and deep that only the long-tongued butterflies and moths and persistent bumblebees can reach it. There is but one stamen. Just above the stigma there are two pollen clusters, each composed of several small packets of pollen tied together with an elastic thread. At the end of these threads is a sticky disk. This disk adheres to the head of the nectar-sipper and is carried to the next flower visited. Here, in turn, the pollen packets come into contact with the sticky substance of the stigma and fertilization takes place.

Orchids are among our most progressive flowers, having risen to that stage of development where self-fertilization is quite impossible. Indeed, some are so sterile to their own pollen that when it is placed directly upon the stigmas no seeds are set.

But if the orchids depend upon the insects to carry their pollen to one another, these winged messengers measure up fully to the trust reposed in them. By actual count one orchid was found to bear more than a million seeds. Fortunately, only a small portion of these ever grow into other plants. If all of them did, the whole earth would soon wear an unbroken covering of orchids.

The yellow fringed orchid is an elegant and stately flower. It ranges from Vermont and Ontario to Florida and Texas and prefers wet meadows and sandy bogs, where it grows from one to two feet tall. It blossoms during July and August.

BROOM OR STIFF YELLOW FLAX

Linum medium (Planch.) Britton [Plate VI, middle]

No claims to superior beauty can be made on behalf of the subject of this sketch, for, stiff-stemmed, close-leaved, and small-flowered, it is neither graceful nor gorgeous.

The professional botanist tells us that "its leaves are acute, erect, or ascending; pedicels short; inner sepals commonly erose or somewhat glandular-ciliolate." Which means, in every-day words, that the leaves are sharp-pointed and grow upward, hugging the stalk; that the little stems on which the flowers grow are short; that the outer coverings of the buds have a gnawed and hairy appearance at the edges.

This plant is a cousin of *Linum usitatissimum*, which has given the world its linen from time immemorial. The days are gone when every American farmer raised some flax and when the women folk had to use their spare time, after cooking, tending the garden, feeding the chickens, dressing the children, cleaning the house, etc., in spinning and weaving, and with their passing the flax family has had to shift for itself.

The range of the broom flax extends from Vermont and Ontario southward. It prefers a dry or sandy soil. The honeybee is its principal pollen-carrier.

PURPLE OR WATER AVENS

Geum rivale L. [Plate VI, right]

This graceful plant, with its nodding, bell-shaped blossoms, belongs to the rose family, which is distinguished for the diversity of forms assumed by its members. It is a cousin of the ninebark, the meadow-sweet, the hardhack, the goatbeard, the pear, the apple, the chokeberry, the mountain ash, the white thorn, the strawberry, the cinquefoil, the agrimony, the rose, and the sweetbrier.

From Newfoundland and Saskatchewan to New Jersey and Colorado, this species seeks low, wet ground, being almost as much of a wader as the pickerelweed (see Plate III).

So sweet is the purple avens' honey-cup that the bumblebee will often desert his favorite primrose for it, and very frequently grows so impatient for the flower's opening that he eats through the sepals in order to steal the sweets.

The purple avens' flowers nod their heads to keep the dew and rain from filling their cups and drowning their pollen.

CORN COCKLE

Agrostemma githago L. [Plate VII, left]

Whether the corn cockle is a beautiful flower or a pestiferous weed depends upon the point of view. Like the English sparrow and the rat, it insists upon residing with the farmer, whether he will or he won't, and unless it is to get the better of the argument he must keep fighting all the time.

The ox-eye daisy, the yarrow, the mulleins, and the plantains ask no specially prepared

seed-beds. They grow side by side with the grasses. But the corn cockle is a little more fastidious. It likes the same surroundings as wheat and matures its seeds at the same time. In this way it gets reaped and threshed with the grain, garnered with it, and sown again with it.

Thus it not only steals its bit of ground away from the wheat, but forces the farmer to cultivate it.

Like so many of the weeds that make the farmer's hard life harder, the corn cockle is an immigrant from Europe. It is a native of Asia, but followed civilization into Europe, and then crossed the seas to America in earth ballast, in packing straw, and in seed grain.

Once landed on these shores, its star of empire swept westward until it claims as its own the entire wheat-, barley-, rye-, and oats-growing territory of the New World.

Even in Shakespeare's time it was a pest. Biron, in "Love's Labour's Lost," exclaims, "Alons! Alons! sow'd cockle, reap't no corn." Still further back in the history of man we find Job exclaiming, "Let thistles grow instead of wheat and cockle instead of barley."

The United States Department of Agriculture classes the corn cockle as one of the principal poisonous plants, the dangerous qualities being contained in a soluble, odorless powder called saponin, which possesses a sharp burning taste and provokes violent sneezing when inhaled, even in small quantities. When agitated in water, it foams like soap.

When the corn cockle blossom opens it carries a fine "display ad." in magenta and white, announcing that messengers are wanted to convey pollen to other flowers. The length of the carriers' tongues rather than the fleetness of their wings is the test of employment. One species of night-flying moth never seeks service elsewhere, and while sipping the nectar of the cockle-cup and carrying the pollen from the blossom's anthers also takes occasion to lay its eggs in the heart of the flower, so that its larvæ may have a well-stocked larder of immature cockle seeds.

The corn cockle has many family relations, among them being the spurries, the pearworts, the chickweeds, the campions, the catchflies, and the carnations. Bouncing-bet and ragged-robin are likewise cousins.

LAMBKILL OR SHEEP LAUREL

Kalmia angustifolia L. [Plate VII, middle]

The heath family, of which the lambkill is a member, has many branches, ranging from the creeping snowberry and the trailing arbutus to the kalmias, the rhododendrons, the azaleas, the huckleberries, and the cranberries.

The lambkill is a shrub of lesser proportions than the common kalmia, or mountain laurel (whose biography appears on page 488 of the June, 1917, number of THE GEOGRAPHIC), and its flowers are similar but smaller and of a crimson pink. They cluster closely around the stem, which is terminated by newer leaves, this again being a point at variance with the larger species.

The range of the species is from Canada to Georgia.

GAYFEATHER OR BLAZING STAR

Lacinaria squarrosa (L.) Hill. [Plate VII, right]

The gayfeather, which possesses many other names in the vernacular, among them "colic root," "rattlesnake master," "blazing star," and "button snakeroot," flowers from June to September and is found as far north as Ontario, as far south as the Gulf of Mexico, and as far west as Nebraska.

The flowers at the top of the stem open first and those further down in the order of their position. All have both stamens and pistils, and cater to the long-tongued bees, flies, and moths.

The rural name of "rattlesnake master" comes from the belief that the tuber at the root of the plant possesses properties that will cure the bite of a rattlesnake.

PURPLE WILD-BERGAMOT

Monarda media Willd. [Plate VIII, left]

The purple wild-bergamot, like the hyssop skullcap, pictured on Plate IV, and described on page 53, is a member of the mint family. It is a variety, according to some authorities, of the species *Monarda fistulosa*. It grows in most thickets from the Appalachian Mountains west to Minnesota.

The *Monardas* are particularly adapted to the entertainment of the butterflies, though bumblebees also frequent them and sometimes hive bees are their guests. The two stamens and the two-parted pistils are so situated that no visitor whose tongue is long enough to sip the blossom's nectar can avoid a pollen dusting from the former or escape paying a pollen toll for the latter.

HAIRY PENTSTEMON OR BEARD TONGUE

Pentstemon hirsutus (L.) Willd. [Plate VIII, middle]

Flowering in midsummer, over a territory that stretches from Ontario and Manitoba to Florida and Texas, the hairy pentstemon is a member of the versatile figwort family, which includes the mulleins, the yellow toadflax, and the Indian paintbrush, described in previous issues of the NATIONAL GEOGRAPHIC MAGAZINE (May, 1915; June, 1916, and June, 1917, respectively). Its preferences in matter of environment lead it to dry or rocky fields, thickets, and open woods.

Its blossom first develops stamens and is therefore in the first stage of its existence a male flower. When these have given their pollen to the bees they are succeeded by pistils, which transform the blossom into a female flower. Thus cross-fertilization is assured.

The scientific name comes from the densely bearded, sterile fifth stamen. This stamen makes a series of curves from the upper to the under side of the flower, a fact which makes it serve admirably in closing the mouth of the

flower against pilfering invaders. A long-tongued bee has to thrust its head deep into the flower in order to get a sip of nectar, and in this way gets a face-dusting of pollen, which is communicated to the pistils of other flowers visited.

CRIMSON-EYE ROSEMALLOW

Hibiscus oculiroseus Britton. [Plate VIII, right]

One must go to the marshes along the coast of eastern United States to meet the beautiful crimson-eye rosemallow, which flowers from July to September.

It is a cousin of the gorgeous swamp rosemallow, described on page 587 of the June, 1916, number of THE NATIONAL GEOGRAPHIC, and is a native American plant, unlike the marsh-mallow, another cousin, which contributes so largely to the confectioner's art. Still another cousin is the okra plant, without which no southern vegetable garden is complete. Some of the mallows bear flowers that are unisexual—either male or female, possessing only stamens or pistils, as the case may be. Most of them, however, are bisexual, having both stamens and pistils, but accomplishing cross-fertilization by having the stamens wither before the pistils come to maturity.

BEACH PEA

Lathyrus maritimus (L.) Bigel. [Plate IX, left]

The beach pea, rejoicing in numerous other names, among them one denoting a rugged vitality—everlasting pea—belongs to the pulse family. Among its cousins are the wild indigo, the rattlebox, the lupines, the clovers, the tick trefoil, the nonesuch, the vetches, the hog peanut, the wild bean, and the Texas bluebonnet, which, along with the red clover, was described in the June, 1917, number of THE GEOGRAPHIC (pages 497 and 517).

The beach pea to its admirers mirrors the sea and the heavens—the clear green of the ocean in its leaves and the azure hues of the sky in its petals. It gladdens the sandy beaches of the seashore from New Jersey to the Arctic regions and from southern Oregon to northern Alaska.

The style of the flower's pistil is hairy on its inner side, and when the nectar-seeking bee lands for a sip of sweetness his movements cause the style to vibrate. It thus becomes an automatic duster, brushing the pollen onto his coat.

The beach pea, like many other members of the pulse family, has worked out its own system of cross-fertilization. The clover is a striking illustration of this. Without the aid of long-tongued bees it is unable to set seed. Australia could not grow clover from native seed until it imported bumblebees to fertilize the blossoms.

COMMON MILKWEED

Asclepias syriaca L. [Plate IX, right]

One does not admire the milkweed either for its beauty or its odor, but rather for its cunning. Its flowers lack brilliancy, and if one breaks the stem it exudes a sticky, milkish juice with a sickening odor. But in its methods of insuring the perpetuation of the species it displays unusual ingenuity in making the insects its servants, and it has been able to girdle the warm and temperate zones of the earth with its many hundred species.

Its blossoms are not fragrant to human beings, but they possess a wealth of nectar for bees, wasps, flies, beetles, and butterflies.

When these animated airplanes attempt to effect a landing on a blossom they find the landing stage very slippery; but as they maneuver about for a foothold they get their legs caught in fine little clefts at the base of the flower. Attempts to extricate themselves serve only to pull the imprisoned leg into a deep slot. Here it encounters a tiny pair of saddlebags filled with pollen.

With a vigorous jerk the insect is usually able to free the imprisoned leg, but as he does so the pollen saddlebags hang to it. Bees have been caught, according to Blanchan, with a dozen of these tiny saddlebags hanging to a single leg.

Flying away to another flower, the visitor is caught as before, but in the struggle to free himself he loosens some of the saddlebags adhering to his legs in such a way that the pollen they contain will finally find its way into stigmatic chambers. In this way cross-fertilization is assured.

Only strong-limbed insects can free themselves from the milkweed blossom; many a hive bee has been held prisoner until death ended its captivity.

Any one can study the milkweed's method by holding a house fly by one of its wings on the blossom. Trying to get a foothold, its leg will enter the slot. Extricate it, and the little saddlebags come along.

Not only does the milkweed use insects to insure the setting of seed, but it also employs the breezes. Each seed has its own bit of down, light as a feather, and as in ancient days men set out across the seas, in boats driven by the wind, to establish colonies in the ends of the earth, so the milkweed seed sets out on its tufts of down to find a place to grow.

The common milkweed grows from three to five feet tall, flowers from June to September, prefers roadsides, fields, and waste places, and is found from the Atlantic coast to the Rocky Mountains and from New Brunswick to South Carolina. It is a cousin of the butterfly-weed described on page 589 of the June, 1916, number of THE GEOGRAPHC.

SWEETSHRUB

Calycanthus floridus L. [Plate X, left]

This delightfully fragrant shrub grows from four to eight feet high. In the north it is principally a cultivated garden plant, but in Virginia and the Carolinas and westward it grows wild in rich dry soils. It flowers from April to September, usually reaching the height of its season about wheat harvest.

While best known as sweetshrub, it sometimes is called strawberry shrub or Carolina

allspice. The *Calycanthus* family, to which it belongs, is a small one, and few of the members have the sweet odor of *floridus*.

POKEWEED

Phytolacca americana L. [Plate X, right]

The pokeweed's range is from Maine to Ontario and southward, where it flowers from July to September, in low grounds and rich soils. It masquerades under many names, such as poke, scoke, garget, and pigeon berry.

The pokeweed is a tall, smooth herb, growing from 4 to 12 feet high and possessing a strong-smelling juice. Its roots, which are perennial, are highly poisonous, yet its young shoots, or "sprouts," are edible and are often prepared like asparagus. Its shining purple berries form a late-summer feast for robins, flickers, downy woodpeckers, chewinks, and grosbeaks.

An ointment is made from the plant for the treatment of ringworm and rheumatism, and also for relieving itching and inflammation of the eyes.

This plant is said to have derived its name from an Indian word, "pocan," which is applied to any plant yielding a red or yellow dye. The followers of James K. Polk, in the Presidential campaign of 1844, wore the poke leaf as their emblem.

The *Halictus* bees are its principal insect visitors in flowering time. The poke prefers cross-fertilization, bringing its stamens to maturity before its pistils and thus giving insects a chance to carry its pollen to other plants. In stormy, rainy weather, when its benefactors cannot be on the wing, it curves its styles so as to bring the stigmas into contact with the anthers of the stamens, and thus brings about self-fertilization.

CLAMMY GROUNDCHERRY

Physalis heterophylla Nees. [Plate XI, left]

The subject of this sketch belongs to that ubiquitous nightshade family, which includes the potato, with its tuber, and the tomato, with its luscious fruit; the deadly nightshade, that does not belie its name; the horsenettle, the buffalo bur, the tobacco, the eggplant, the Jimson weed, henbane, and the matrimony vine.

The clammy groundcherry in its prime is an upstanding herb, but late in the season it sprawls. It usually grows from one to three feet high and claims most of North America east of the Rockies as its range. It requires rich soil.

CHARLOCK OR FIELD MUSTARD

Brassica arvensis (L.) Ktze. [Plate XI, right]

Charlock or field mustard is one of the undesirable aliens of the plant world that succeeded in passing the Ellis Island of American commerce and securing a foothold in this country for its pestiferous progeny. Exactly when it landed is not known, but it has spread throughout the grain-growing regions east of the Rocky Mountains.

This weed goes on its domineering way in spite of innumerable battles the careful farmer fights to repel its invasion. What farmer's son, too young to do the heavier work that farm operations demand, has not been detailed to go into the fields, armed with a hoe, to give battle to this invader so tenacious of life and of its "squatter sovereignty," and what wonder that a broiling sun, a big field, and this numerous foe have often caused a boy to lose interest in farm life and sent him on his way to the crowded city!

This plant, growing from one to two feet high, belongs to one of the largest families that botany knows, the mustard family. Its closest relatives in the family are the turnip, the rutabaga, and the black and white mustards. Its more distinct cousins include whitlowgrass, sweet alyssum, the cresses, peppergrass, shepherd's purse, and radishes.

The charlock blossoms in late summer. The brilliant *Syrphidæ* flies and honeybee, both having a fondness for yellow blossoms, come in great numbers and serve as pollen-bearers. The stamens mature ahead of the pistils.

MISTFLOWER

Eupatorium coelestinum L. [Plate XII, left]

This close relative of the joe-pye-weed, the white thoroughwort, the boneset, and the white snakeroot loves rich soils, in which it grows from New Jersey to Michigan, Kansas, and the Southwest. It is somewhat hairy, and, as a composite that has flowers ranging from violet to purple, it represents one of the most advanced members of the floral kingdom.

PINK CORYDALIS

Capnoides sempervirens (L.) Borck. [Plate XII, middle]

Cousin of the mountain fringe, the Dutchman's breeches, and the squirrelcorn, the pink corydalis belongs to the fumitory family, which is never intrusive, and would rather please the eye of man than get in his way. In New England it almost supplants the Dutchman's breeches. The stem is slender and erect and the stalk grows from eight inches to two feet tall. It prefers rocky soil and its range is from Maine to the Carolinas and westward to Minnesota.

NEW YORK ASTER

Aster novi-belgii L. [Plate XII, right]

With flowers ranging from pale violet to blue violet, the New York aster, sometimes known as the willow-leaved aster, lays claim, through Gray, to being "the commonest late-flowered aster of the Atlantic border." It has a head like an ox-eye daisy, except in color, with from fifteen to twenty-four rays. The stalk grows from one to three feet tall. It prefers the swamp to dry land and clings close to the coast from Maine to Georgia. It has several varieties, including *lævigatus* and *litoreus*, the former smooth and with upper leaves clasping the stem, the latter low and stiff.

TURTLEHEAD

Chelone lyoni Pursh. [Plate XIII, left]

Growing in ditches, beside streams, and amid swamps, this interesting member of the figwort family has many aliases in the vernacular. In some localities it is called "snake-head," in others "codhead." Some people call it "shell-flower," while others have christened it "balmony."

Its flowering season is from July to September and it is found in swamps and wet thickets in the mountains from Virginia southward. It attains a height of from one to three feet. The leaves are reputed to have tonic properties in the treatment of liver complaints.

Even bumblebees have difficulty in reaching the overflowing nectar cups of the turtlehead before it reaches maturity; but as soon as the heart-shaped anthers have their dust-bags of pollen powder ready, the flower opens wider and the visitors have their full of sweets while taking their dusting of pollen.

TEASEL

Dipsacus sylvestris Huds. [Plate XIII, right]

The chief distinction of this species is the fact that it is the parent of the cultivated teasel so widely used in raising the nap on various woolen cloths. The wild species have straight prickles on the heads and are therefore valueless in cloth finishing; the cultivated teasel has the hooked prickles.

The heads of the cultivated variety are fixed around a long cylinder, or roll, which is made to revolve against the surface of the cloth. The hooks of the prickles take hold as they turn and raise the nap. No mechanism has yet been devised that can take the place of the teasel bracts, with their combined rigidity and elasticity. They are strong enough to nap the cloth, but too weak to tear it.

The leaves grow out from the teasel stem in such a way that they form little cups at their base. These collect dew and rain, the water serving to keep ants and other creeping creatures from reaching the flowers, in the same way that tin disks on hawsers keep rats from going between ships and docks.

Each tiny floret on the teasel's head consists of a long tubular corolla made up of four petals grown together. The exposed parts of these petals are of pale lilac; the lower, almost hidden, parts are white.

On the first day of the floret's life their four anthers show and shed pollen. On the second day these wither and the pistil comes to maturity.

The spiky nature of the teasel's head prevents insects from walking over it. Therefore they must dive head foremost into the tubes if they want the honey these have to offer. Thus they always carry pollen from the flowers with mature stamens to those with mature pistils.

The teasel blossoms from July to September over a range that reaches from Maine and Ontario to Virginia and the Mississippi River. It prefers roadsides and waste places.

VENUS LOOKING-GLASS

Specularia perfoliata (L.) A. DC. [Plate XIV, left]

This member of the bluebell family has a wand-like stem that is sometimes too weak to stand alone, and is often found leaning on surrounding vegetation for support. It blossoms from May to August and grows almost everywhere, from upper Canada to middle Mexico, preferring waste places and dry woods.

The late John Burroughs thus describes this flower: "A pretty and curious little weed, sometimes found growing in the edge of the garden, is the clasping *Specularia*, a relative of the harebell and of the European Venus looking-glass. Its leaves are shell-shaped, and clasp the stalk so as to form little, shallow cups. In the bottom of each cup three buds appear that never expand into flowers, but when the top of the stalk is reached, one, and sometimes two, buds open wide into a large, delicate, purple-blue corolla. All the first-born of this plant are still-born, as it were; only the latest, which spring from its summit, attain to perfect bloom."

FERNLEAF FALSE-FOXGLOVE

Aureolaria pedicularia (L.) Raf. [Plate XIV, middle]

This bright member of the figwort family, growing from one to three feet tall and having lemon-colored, bell-shaped flowers an inch or more in diameter, would be worthy of cultivation if it were not a dangerous companion for the honest folk of the flower garden. In the biographies of the mistletoe (see THE GEOGRAPHIC for June, 1917) and the dodder (see page 59) we see how honest plants have degenerated into vampires—blood-suckers that live not by their own toil, but by invading the vitals of other plants for sustenance.

The false-foxgloves have only recently started on this downward path, but they have gone far enough to wrap their roots around those of other plants and steal their juices. Knowing their traits, no gardener will invite them into his garden, and they must therefore be content to live on the borders of dry woodlands and thickets in their natural range, which is from Maine west and south to Minnesota and Missouri.

BLUEBELL

Campanula rotundifolia L. [Plate XIV, right]

No flower in all Nature's garden has more of romance and interest clustering about it than the bluebell. What heart has not thrilled at the lore and legends of the bluebells of Scotland! And yet Scotland has no monopoly of them. They are at home throughout much of the Northern Hemisphere, gladdening impartially the Asiatic regions of Europe, Asia, and America. In America they wander as far south as the Mason and Dixon Line in the East, to Arizona in the Rockies, and to California in the Sierras.

A dainty and delicate perennial is this modest flower, but with enough strength to climb 5,000 feet without turning a leaf.

Another name of the bluebell is harebell, a survival of the days of poor spellers, who spelled hair with an "e." It was known in Scotland as the "hairbell" because of the filamental nature of its branches. Other old English names for the bluebell were "ladies' thimble" and "witch's thimble."

The flowering season of the bluebell is from June to September.

TANSY OR BITTER BUTTON

Tanacetum vulgare L. [Plate XV, left]

The tansy is an example of a flower that has not yet learned the art of display in advertising. By an effective use of white or colored rays or petals, the ox-eye daisy, the black-eyed-susan, and other flowers can accomplish more with one head on a branch than the tansy does with a dozen. Many plants have forty of these heads, and each head contains some 400 florets, 16,000 florets to a plant.

This plant grows from eighteen to forty inches tall, loves the roadsides, and ranges from Nova Scotia to North Carolina and Missouri. It blooms from July to September.

Like many another plant, the tansy came to America as a cultivated herb. The colonists thought they could not do without their tansy herbs and bitters, and least of all without their tansy tea. But, once here, the tansy got tired of the coddling of the garden and gave ear to the call of the wild.

Under a lens the leaves are seen to be dotted with glands containing the oil that gives the plant its strongly aromatic flavor and scent. It is this oil that has given the tansy its value in medicine and cookery.

SILVER ASTER

Aster concolor L. [Plate XV, middle]

Growing in dry, sandy soil near the coast, in Massachusetts and southward, this attractive member of the aster branch of the composite family has a stem from two to three feet tall, unbranched below the flower, and with leaves crowded and pressed close to it.

Sir John Lubbock was of the opinion that all flowers originally were merely pistils and stamens surrounded by green leaves. Blue has been shown to be the favorite color of bees, and in their efforts to please, the flowers have first produced either white or yellow petals and rays, and then have become red, as a rule, before being able to stand among the elite blues.

EARLY GOLDENROD

Solidago juncea Ait. [Plate XV, right]

As was related in the biography of the field goldenrod, which appeared in the June, 1917, number of THE GEOGRAPHIC, the goldenrods have representatives in almost every month of the floral calendar, in almost every kind of soil, and in almost every locality. The subject of this sketch comes into bloom by the end of June and remains until the end of September. It grows from two to four feet tall on dry, rocky banks and along roadsides from Maine to North Carolina and westward to Missouri.

With their wealth of blossoms the goldenrods are indeed the merchant princes of flowerland. Their showy display advertising catches the eyes of innumerable hosts of insects, and they do a land-office business in the distribution of their pollen.

ORANGE MILKWORT

Polygala lutea L. [Plate XVI, left]

Rejoicing in its bucolic name of wild bachelor's button, the orange milkwort, or wild bachelor's button, has clover-like heads closely packed with small florets. The plant grows from 6 to 12 inches tall. *Polygala's* flowering season is from June to October, and it is equally at home in the swamps of Long Island, the pine barrens of New Jersey, the coasts of Florida, and the lowlands of Louisiana.

Some of the milkwort species have two sets of flowers, "one for beauty and one for use, one playful for the world and one serious for posterity."

In truth, however, such milkworts, afraid that their fine flowers may fail to set seed, because the rains keep the bees indoors, or some other catastrophe occurs, have another set, much less showy, whose development was arrested in the bud. Without petals, nectaries, or fragrance, their stamens are small, their pistils immature, and they have nothing to offer the bee. But if their showy sisters fail to perpetuate the family, they step in, self-fertilized, and save the family from extinction.

COMMON DODDER

Cuscuta gronovii Willd. [Plate XVI, right]

Cousin of the bindweeds and the morning-glories, the common dodder is a black sheep of a proud family. Early in life it is well-behaved, getting its living from the soil in an orthodox fashion. But just as soon as it finds a suitable plant upon which to attach itself, it sends out innumerable tiny suckers that gradually exhaust the juices of the plant upon which it makes its parasitic attack. While it is drinking the life sap of its unwilling host it forgets to maintain its connection with the soil, the stem from the ground wasting away, and if its host perishes it must die also.

Living off of juices other plants have drawn out of the soil, it loses its chlorophyll and becomes a leafless, scale-bearing plant.

The dodder develops an abundant supply of globular seed-vessels. These either fall to the ground and sink into the soil or float off in the water to found new colonies.

Known in some places as the "love vine" and elsewhere as "angel's hair," the dodder flowers from July to September and finds its preferred habitat in moist soil, meadows, ditches, and beside streams. Its range is from Nova Scotia and Manitoba to the Gulf States.

THE COMPLETED APSE OF THE WASHINGTON CATHEDRAL, ON MOUNT ST. ALBAN

Situated on a beautifully wooded crest, this shrine fulfills plans conceived by George Washington for a church in the Capital City to be devoted to national purposes. Its erection was begun in 1915. Several famous cathedrals in England contributed some of their ancient stones and marbles to be made into carvings and statues for its adornment. The main body of the cathedral, measuring 500 feet from the western front to the apse at the easterly end, will be equal in length to any of the English cathedrals except York (see text, page 81).

CATHEDRALS OF THE OLD AND NEW WORLD

By J. Bernard Walker

With Illustrations from Photographs in the National Geographic Society Collections

AMONG the capital cities of the world, Washington carries the unenviable distinction that it possesses no monumental building dedicated to the worship of God.

France has its Notre Dame, London its Westminster, Rome its St. Peter's, and even in far-distant Constantinople the majestic dome of Sancta Sophia puts the Moslem people in perpetual remembrance of their God and His Prophet.

But Washington, the capital of the greatest nation of these later days, for all its superb display of costly buildings—governmental, municipal, and memorial—has seemingly forgotten to raise any national tribute to that God of our fathers in recognition of whom the Republic was founded, and under whose fostering care it has grown to its present commanding position among the sovereign states of the world.

Not to any neglect of George Washington and the founders of the Republic may this anomaly be charged. On the contrary, the scheme for a representative national church of becoming size and dignity occupied the mind of the Father of his Country, and he saw to it that when Major L'Enfant drafted the plans of the Federal City a large plot of land, centrally situated, should be reserved for such a purpose. Upon that square now stands the red, Brobdingnagian pile of the Pension Office Building.

So far as the question of site is concerned, the change in the city's plans is not to be regretted; for the new Protestant Cathedral of Saints Peter and Paul, whose recently completed apse lifts its delicate beauty upon the summit of Mount St. Alban, will occupy the noblest site of any cathedral in the Old World or the New. Conspicuous from any point in Washington, the 500-feet stretch of nave and choir, crowned by the lofty towers of the western front and the crossing, will be visible also throughout a far-flung radius of the surrounding country.

A CATHEDRAL SET ON A HILL

Every American who has made a tour of the cathedrals of Europe must have regretted that, more often than not, these noble structures are so closely beset with commonplace buildings as to render any near view of their beauties impossible.

The Washington cathedral will suffer no such disadvantage. The site, comprising 60 acres of beautifully wooded land, lies on the crest of a hill, at an elevation of nearly 400 feet above the Potomac River. In every direction the ground falls away from the Cathedral close, with the result that, from whatever side it is viewed, this superb structure will be revealed against the skyline in all its unobstructed majesty.

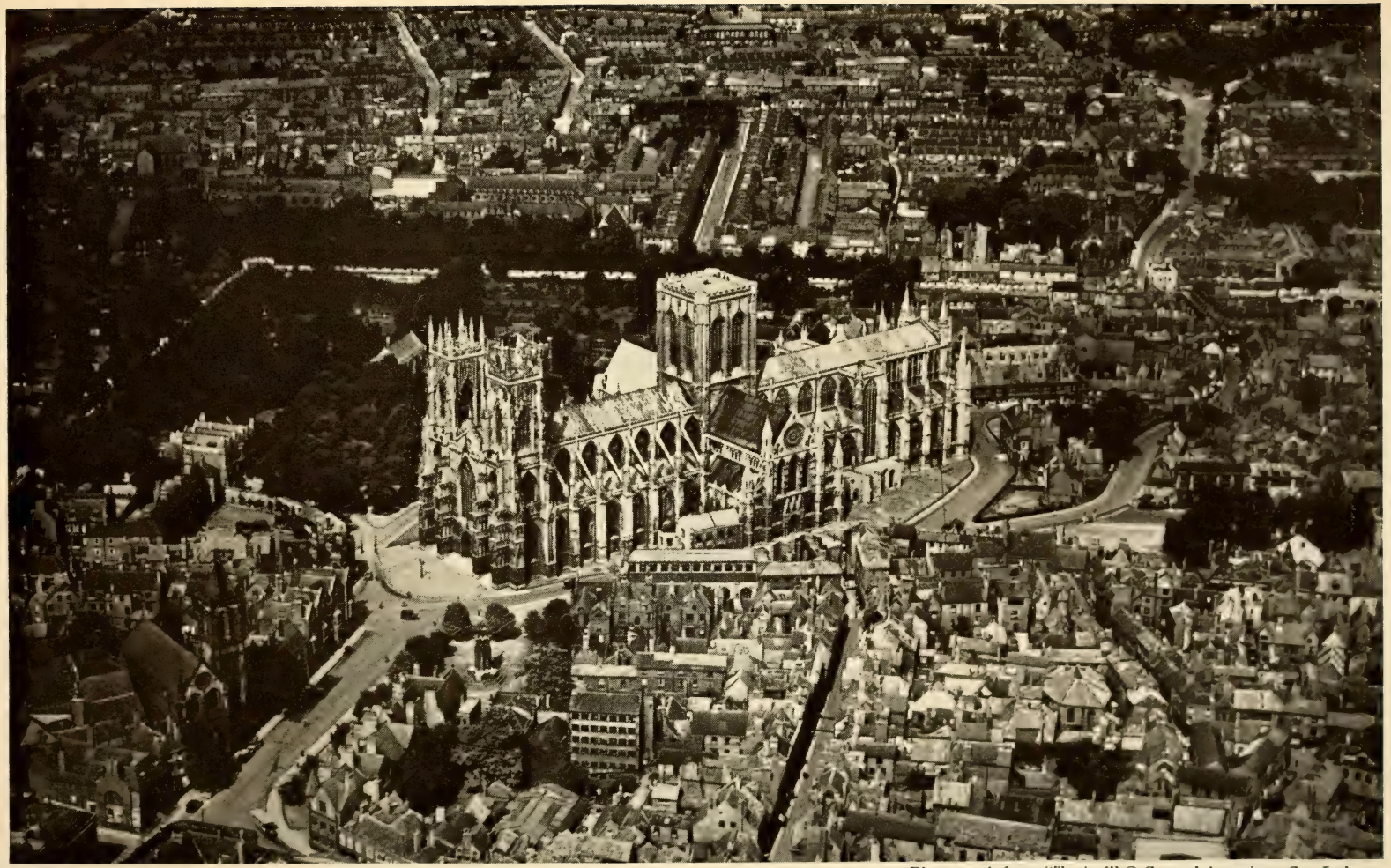
COMPARISON WITH THE CATHEDRALS OF EUROPE

Be he amateur or professional, every student of the Washington cathedral will inevitably turn to the Gothic cathedrals of England and France for a scale wherewith to judge of its size and architectural quality; and the accompanying table, in which are included some of the largest and most notable of these, serves to show that it will rank with the largest existing cathedrals in size. Moreover, in the perfection of its proportions and the purity of its style it will stand without a peer.

	Extreme outside length.	Width of nave, center to center of piers.	Height of nave.	Height of towers.
Washington....	500	45	95	262
Westminster...	505	40	102	225
Lincoln.....	500	46	82	271
York.....	518	53	93	198
Ely.....	525	37	72	215
Canterbury.....	543	33	78½	229½
Winchester....	556	40	77	140
Notre Dame...	442	46	110	226
Amiens.....	475	48	140	223
Beauvais.....	Choir only	52	157½	...

The writer ventures this statement without fear of successful contradiction.

The revival of interest in Gothic architecture, which began in the middle of the nineteenth century, has gradually developed a group of architects, at once enthusiastic, serious, and scholarly, whose work bears abundant evidence that they not only have caught the fine spirit of the medieval builders, but are capable of



Photograph from "Topical" © Central Aerophoto Co., Ltd.

YORK MINSTER SEEN FROM THE AIR

York Minster is noted for its size and simple, impressive dignity. It contains a rare collection of early English stained glass, especially in the beautiful rose window of the south transept and in the north transept lancet windows called the Five Sisters. The "cathedra," or bishop's seat, was the center around which missionaries who were strangers in a foreign land naturally gathered in the Dark Ages. These communities were often the sole refuge of the oppressed, the chief repository of learning, and the staunch bulwark of the Christian faith.

CANTERBURY CATHEDRAL

This edifice is by far the most important of all church structures in England. The interest which attaches to it is due, not to its architecture, but to its vastness of scale, wealth of monuments, rare store of thirteenth century glass, and treasured memories of grave historical scenes enacted within its walls. The first church on this site was begun in 597.

DURHAM CATHEDRAL, "HALF CHURCH OF GOD, HALF CASTLE 'GAINST THE SCOT"

A massive, romantic pile, the Norman cathedral of St. Cuthbert is not beautiful externally, but its situation on a densely wooded cliff gives it a peculiar charm. There is a legend that the monks of Lindisfarne were led to its site by a dun cow. The cathedral contains the tomb of the saint and also that of the Venerable Bede, monk and early historian, who died in 735. Practically all the great cathedrals and monastic structures in England were rebuilt after the Norman conquest.

THE CHOIR OF DURHAM CATHEDRAL

The impression made by the magnificent Norman character of the interior is one of "rocky solidity and indeterminable duration." Three incised columns, channeled in spiral, chevron, and trellis patterns, are a prominent feature of the nave. The choir is remarkable for the highly ingenious and artistic union of elaborate Gothic work and massive Norman features. At a certain spot on the pavement is a cross of "blewe marble," marking the limit of the distance to which women might formerly approach the altar.

LICHFIELD CATHEDRAL, ENGLAND'S "QUEEN OF MINSTERS"

This small but beautiful edifice holds its title by virtue of its exquisite proportions, graceful outlines, and rich ornamentation. The three symmetrical spires are called "The Ladies of the Vale." The building is of red sandstone and the main portion dates from the 13th-14th century. Both in England and on the continent, cathedral-building reached its artistic pinnacle during the Middle Ages, and justified Goethe's famous aphorism, "Architecture is frozen music."

© Horace K. Turner, B. Kabatznick, Successor.

WESTMINSTER ABBEY, ENGLAND'S HALL OF FAME, AND THE WESTMINSTER COLUMN

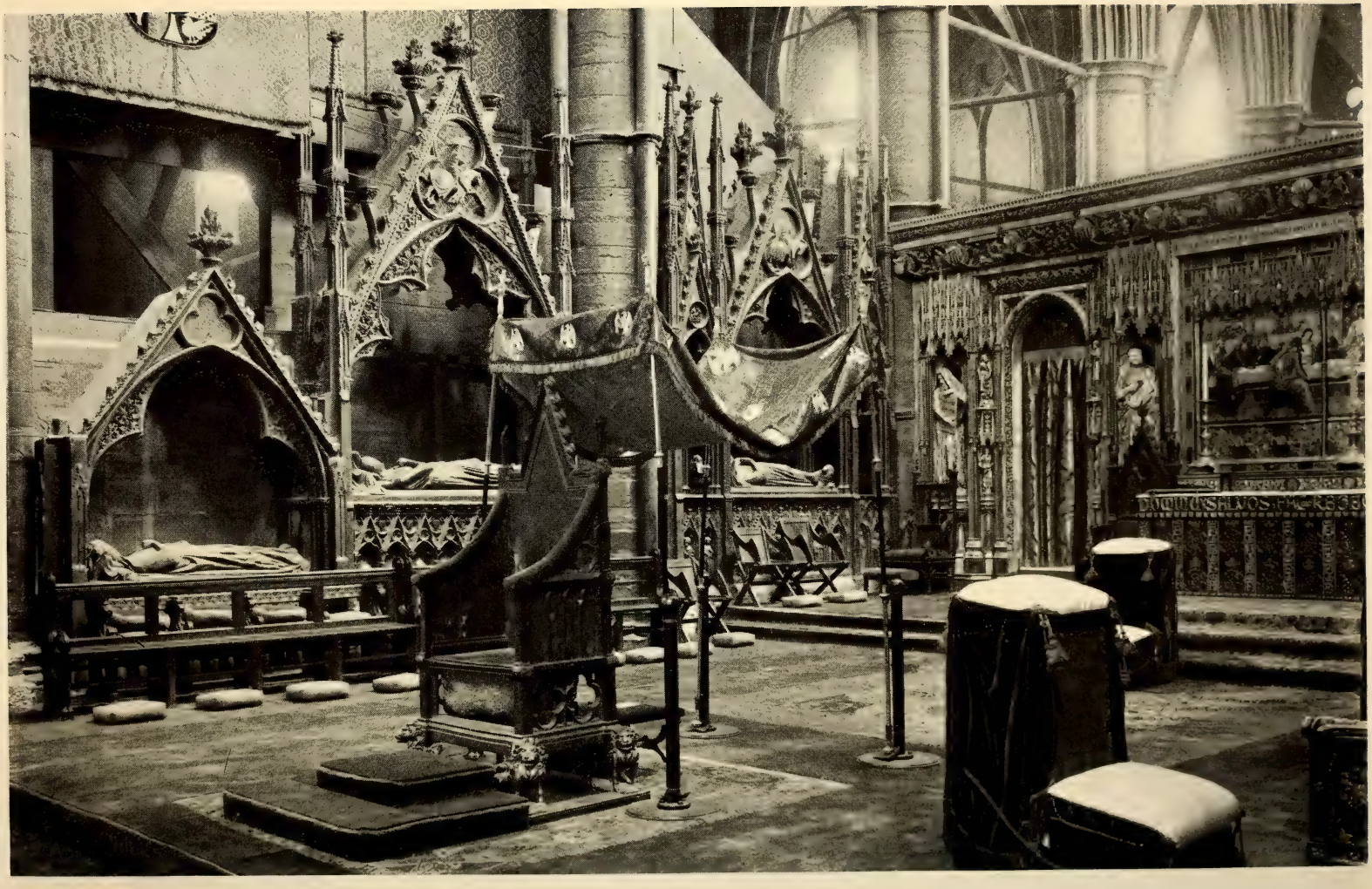
The most celebrated shrine of the English-speaking people dates from 1049. Many of the world's greatest benefactors are buried within its walls, where Washington Irving says, "We feel that we are surrounded by the congregated bones of the great men of past times, who have filled the earth with their renown." The column commemorates the Old Boys of Westminster School who fell in the Crimean War and the Indian Mutiny. Near by stands a copy of the Saint Gaudens bronze statue of Lincoln, unveiled in 1921. (See interior views on pages 68, 69, and 70.)

THE CHOIR, WESTMINSTER ABBEY

The interior of Westminster is noted for its perfect Gothic proportions, which show a marked French influence. The nave and choir, 102 feet in height, are the tallest in England. Just outside the picture is the Poets' Corner, in which the international fame of Longfellow is commemorated by a bust. (See also illustrations on pages 67, 69, and 70.)

THE CHAPEL AND TOMB OF HENRY VII, WESTMINSTER ABBEY

This shrine, one of the latest and finest examples of Perpendicular Gothic, is considered an architectural gem. The ceiling is vaulted with the most delicate and lacelike fan tracery. Mary Queen of Scots and Queen Elizabeth are among the monarchs buried in this chapel.



THE CORONATION CHAIR, WESTMINSTER ABBEY

Under the seat of the Coronation Chair is the Stone of Scone, the emblem of power of the Scottish princes. Tradition says Jacob once used it as a pillow. Edward I brought it to England in 1297, in token of the subjugation of Scotland. Since that time every English monarch has been crowned in this chair except Edward V, who was never crowned, but was murdered in the Tower by order of his uncle, the Duke of Gloucester.

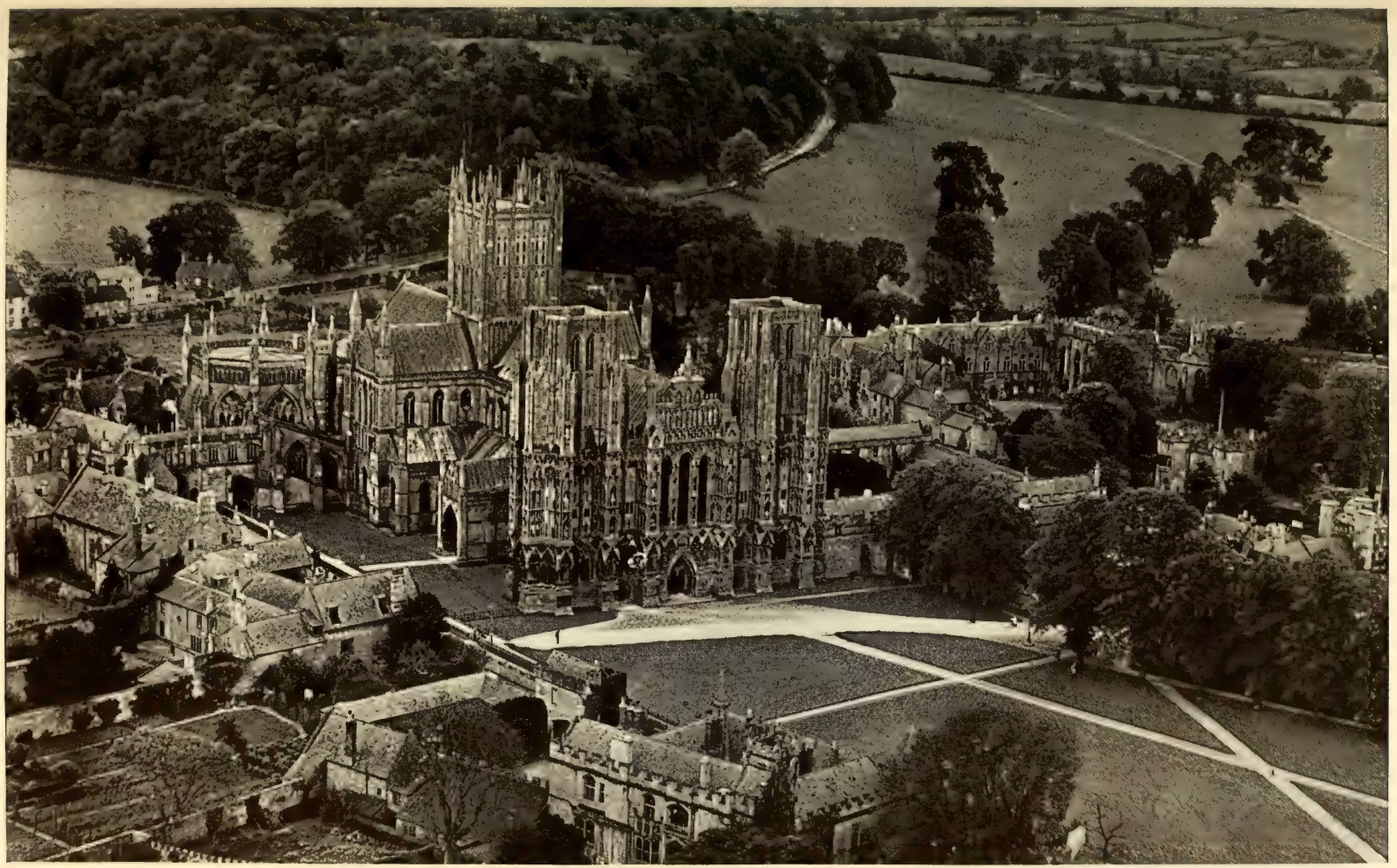
THE INTERIOR OF WINCHESTER CATHEDRAL

The beauty of its proportions, the great length of the nave, and the fine groining lend impressiveness to this interior. The choir is supposed to have been dedicated to Saint Swithin. His connection with the weather is ascribed to the legend that the removal of his body to the shrine prepared for it was delayed forty days by rain. (See also illustration, page 72.)

Photograph from "Topical" © Central Aerophoto Co., Ltd.

WINCHESTER CATHEDRAL

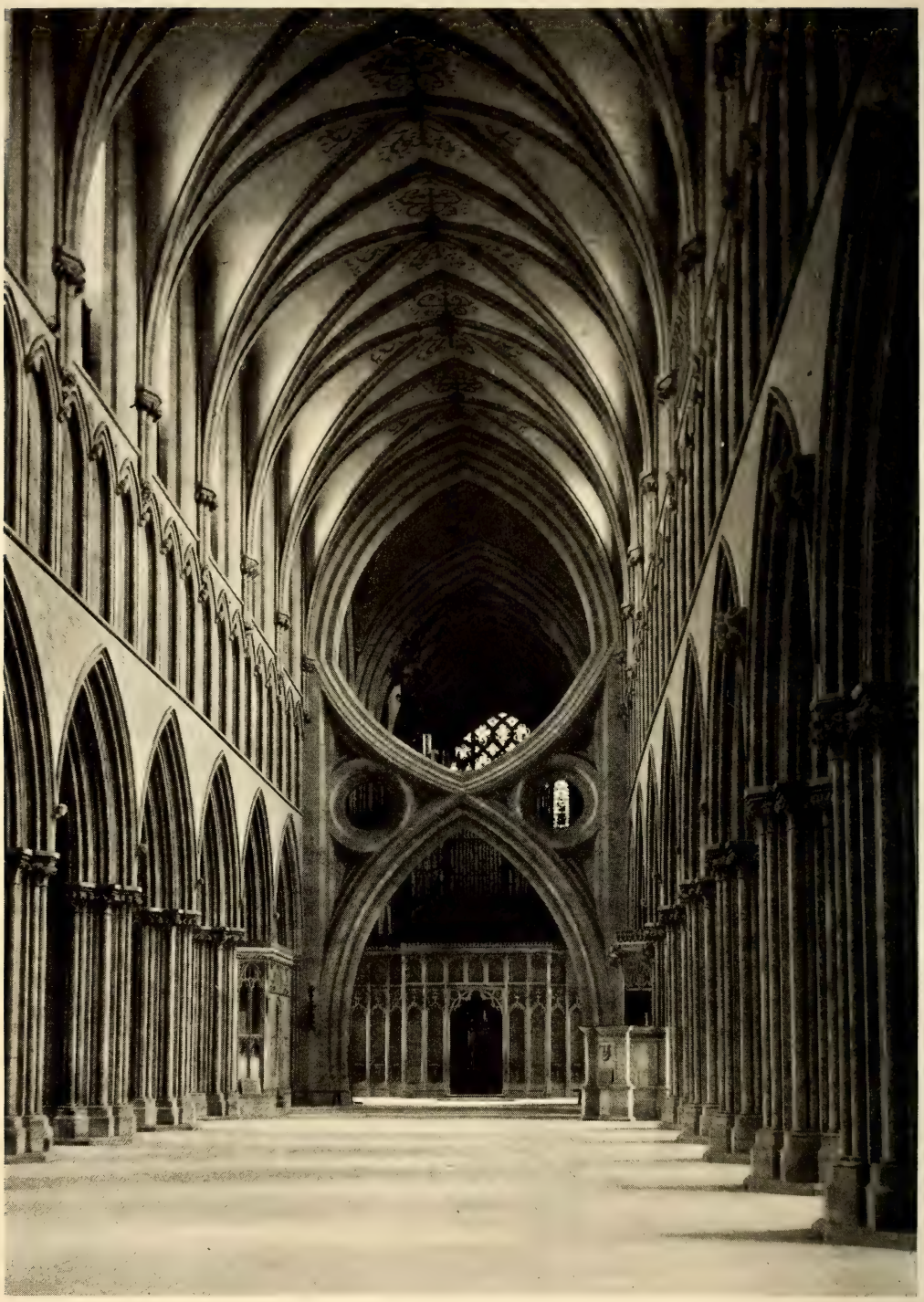
Plain and uninviting externally, Winchester is one of the richest and most beautiful of cathedrals within (see page 71). It is the longest church in England and incorporates every style of English architecture, from the Norman to the Perpendicular. Many men of note in English history are buried here.



Photograph "Topical" © Central Aerophoto Co., Ltd.

WELLS CATHEDRAL—"AN ABODE OF ANCIENT PEACE"

One distinguished authority, declaring that this group of ecclesiastical buildings has no rival among cathedrals in all the world, says: "To most of these objects, taken singly, it would be easy to find rivals which would equal or surpass them. The church itself cannot, from mere lack of bulk, hold its ground against the soaring apse of Amiens (page 83), or against the windows ranging, tier above tier, in the mighty eastern gable of Ely (page 77). The cloister cannot measure itself with Gloucester or Salisbury (page 76); the chapter-house lacks the soaring roofs of York (page 62) and Lincoln (page 80); the palace itself finds its rival in the ruined pile of St. David's. The peculiar charm and glory of Wells lies in the union and harmonious grouping of all." (See interior view, page 74.)



THE INVERTED ARCHES OF THE WELLS CATHEDRAL

This curious St. Andrew's Cross shows how builders of the Middle Ages could convert a necessity into a beautiful architectural feature. During the construction of the central tower (see page 73), it was discovered that the four piers supporting it were weak. A second lower arch was built and a third inverted arch was then added. Thus the piers receive a steady support along their whole height.

THE CHOIR OF SALISBURY CATHEDRAL

Though finely proportioned and impressive, the interior of this church produces a rather cold and bare effect, due to the absence of painted glass (destroyed by the Puritan Reformers) and the rearrangement of the memorial tombs by the so-called restorer Wyatt. Hardly a trace of foreign influence appears. Salisbury is one of the few great cathedrals begun and practically completed within the span of a single generation—between 1220 and 1260. For an exterior view see page 76.

SALISBURY CATHEDRAL

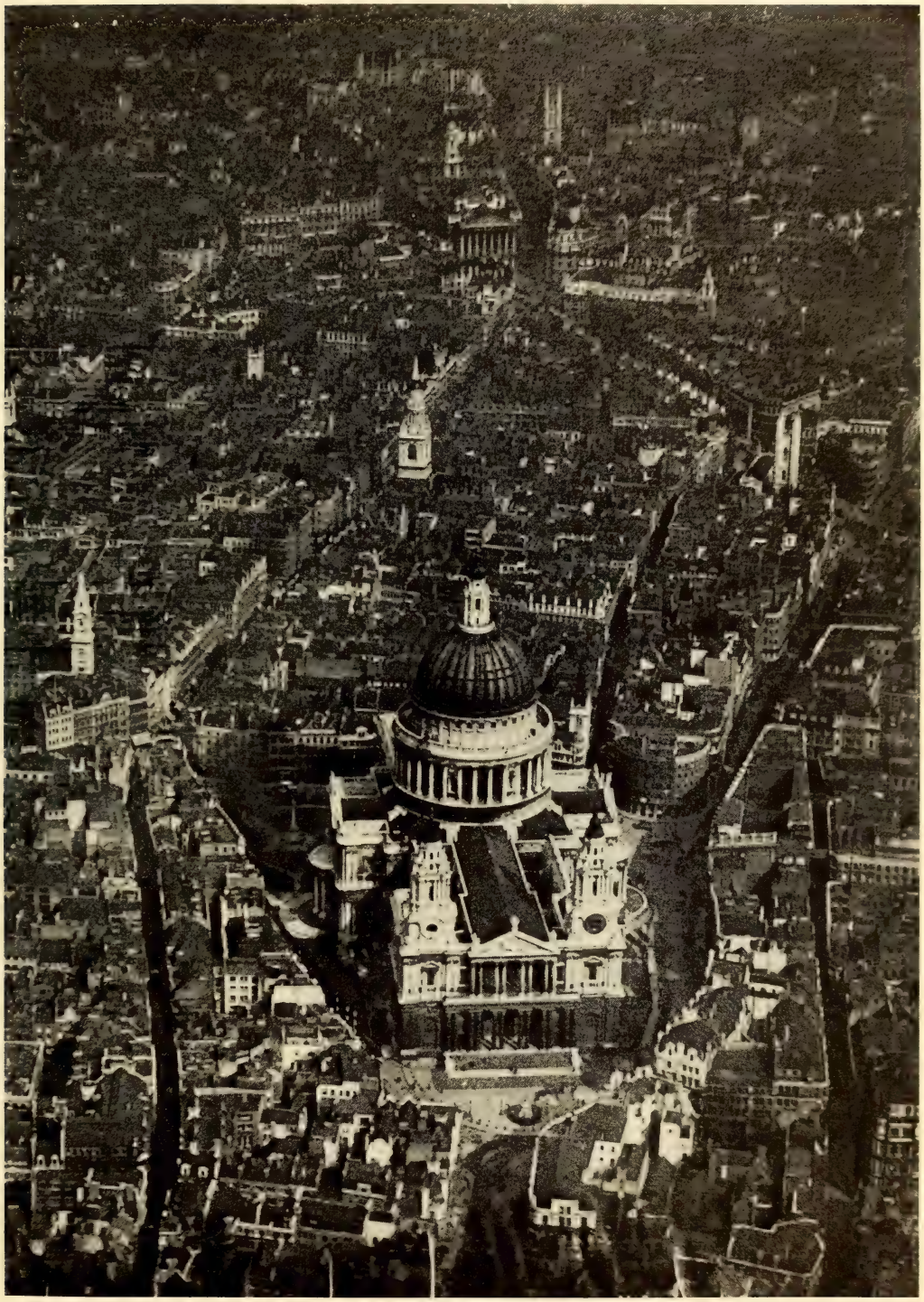
Externally, Salisbury is considered by many the most beautiful of all English cathedrals and one of the least interesting within (see page 75). It presents a fine example of pure Early English workmanship and is noted for uniformity and harmony of construction—"one of the most poetic designs of the Middle Ages." The spire (404 feet) is the tallest in England.

THE ELY CATHEDRAL

This is one of the most individual of all church buildings in England. Its unusual features are the massive castellated Western Tower and the central Octagon.

THE WEST FRONT OF THE PETERBOROUGH CATHEDRAL

The visitor enters the precinct of this majestic religious edifice through a Gothic gateway, seen in the right foreground. In form, proportion, and general effect, this west front is perhaps unrivaled in Gothic architecture. Catherine of Aragon, Henry VIII's unhappy queen, is buried here.



Photograph from "Topical" © Central Aerophoto Co., Ltd.

AIRPLANE VIEW OF ST. PAUL'S CATHEDRAL

This truly noble Renaissance building in the heart of London is the masterpiece of Sir Christopher Wren. The most imposing feature is the central dome, which is acknowledged to be one of the finest that ever crowned a great church. St. Paul's is the burial-place of the famous naval and military heroes of Great Britain, the most conspicuous shrines being those of Nelson and Wellington.

THE NAVE OF LINCOLN CATHEDRAL

The interior of Lincoln's shrine is harmonious and imposing, although some critics declare that the vaulting is too low for the width of the nave. The choir is a very early example of the Gothic style. The presbytery, or Angels' choir, has been pronounced "one of the loveliest of human works." The first church on this site, erected in 1072-92, was split in two, from top to bottom, by an earthquake in 1185. The present structure, with its three lofty towers, crowning a hill, dates from the time of Bishop Hugh of Avalon who came to England in 1186.

avoiding the constructive and decorative exaggerations into which the architects of those days were apt at times to stray.

By a study of the table of comparative dimensions, it will be seen that the main body of the Washington cathedral, measuring 500 feet from the western front to the apse at the easterly end, will be equal in length to any of the English cathedrals except York, which exceeds it by a few feet (see page 62).

The length given for Canterbury, Winchester, Ely, and Westminster includes certain subsidiary buildings, erected in some cases centuries after the main structure and scarcely to be reckoned in an estimate of the over-all length of the main church. Such are the curious Becket Chapel (40 feet) at Canterbury, the Galilee porch (45 feet) at Ely, the Lady Chapel (40 feet) at Winchester, and Henry VII's Chapel (120 feet) at Westminster, where the length of the main church is 410 feet.

The Washington building will be longer than any French cathedral, exceeding Amiens (page 83) by 25 feet and Notre Dame, Paris (page 88), by 58 feet.

The widths of the naves are taken between the centers of the piers. The Washington nave, 45 feet, exceeds Canterbury by 12, Ely by 8, Winchester by 5, and Westminster by 5 feet. Lincoln is wider by 1 foot and York by 8 feet. The French cathedrals given are wider, as to their naves, by from 1 to 7 feet.

In height the Washington nave (95 feet) exceeds all of the English examples except Westminster (page 67), whose apex is 103 feet above the floor. It is outclassed by the French cathedrals, with their vast altitudes of 110, 125, and 157½ feet.

COMPROMISE BETWEEN FRENCH AND ENGLISH PROPORTIONS

In respect of its proportions, the Washington nave escapes the exaggerated length of the English and the disproportionate height of the French cathedrals. As a rule, the English cathedrals are too long for their height, the French too high for their length.

The English monastical builders sought to impress by far-reaching vistas of enormous length, the French by carrying their vaults to awe-inspiring heights.

In the Washington cathedral, with 95 feet of height to 500 feet of length, the architect has found the happy mean of proportional propriety.

Majestic will be the long 500-foot sweep of the nave, choir, and apse, lifting the ridge of their roofs to a uniform height of 134 feet above grade, and relieved by the bold projection of the transept and by the suitably proportioned masses of the two western towers and the great central tower at the intersection of nave and transept.

That this majesty has been secured without any sacrifice of grace and delicate beauty will be evident from a study of the photograph on page 60, showing the already completed apse.

THE CENTRAL TOWER TO BE CHIEF GLORY

The detached buttress piers, surmounted by pinnacles; the flying buttresses between these piers and the clearstory wall; the finely traceried clearstory windows; the boldly battlemented parapet, broken by the pinnacled wall buttresses, with the steeply pitched roof above—all of these will be repeated, with modifications, throughout the walls of the choir and transept.

The nave, although designed in the same Fourteenth Century English Gothic, will be somewhat more sober in treatment than the choir; for we miss here, both on the outer piers and on the wall buttresses, the ornate pinnacles which enrich the choir.

The risk of monotony in a building of this length, due to the repetition of similar forms, is further avoided by extending the side aisles of the choir only to the fifth bay from the tower. Beyond this the wall rises flush from base to parapet, with the buttress piers standing clear of the wall and many feet distant therefrom—all with a most pleasing variety of architectural effect.

In any exterior view of the cathedral, its crowning glory will be found in the great central tower, which rises 262 feet above grade, or 33 feet higher than the lovely Angel Tower at Canterbury, which (in all justice be it said) may be surpassed in height, but in beauty never (see illustration, page 63).

The Washington tower, in spite of its greater mass, possesses the charm which is inherent in good architectural proportioning. As at Canterbury, the vertical

Photograph by Creté

RHEIMS CATHEDRAL, BEST BELOVED SHRINE IN FRANCE, BEFORE ITS BAPTISM OF FIRE

Happily, German guns did not destroy all the beauty of this wonderful cathedral. The Rose Window is gone, however, and many of the 550 statues which adorned the portals. Many kings of France were crowned here. A statue of Jeanne d'Arc stands before the entrance, recalling the historic incident of the part played by the Maid of Orleans in the coronation of Charles VII in this cathedral. A copy of the statue now stands in Meridian Hill Park, Washington.

AMIENS CATHEDRAL

Although regarded as too short for its height, this cathedral is one of the noblest churches of the Old World and has been called "The Parthenon of Gothic Architecture." Colossal statues of twenty-two kings of France stud the gallery in the façade. The deeply recessed portals are dedicated to the Saviour, the Virgin, and to St. Firmin, the first bishop of Amiens.

Photograph by L. Boulanger

ROUEN CATHEDRAL

Considered one of the finest Gothic edifices in Normandy, Rouen's Notre Dame is nevertheless unsymmetrical in plan. The cast-iron spire surmounting the central tower is the loftiest in France—485 feet. With the exception of the highest story, the St. Romain tower (at the left) dates from the twelfth century and is the oldest part of the building.

TOURS CATHEDRAL

The façade, constructed from 1426 to 1547, is a notable example of the waning Gothic style called Flamboyant. Henry IV said it was a jewel for which only the casket was wanting. It is noted for the beauty of its richly colored glass windows. The two towers, 226 and 230 feet in height, are in the Renaissance style of the sixteenth century.

Photograph by P. O. Bugge

TRONDHJEM CATHEDRAL, NORWAY

Begun about 1020, this pride and glory of Norway is the most northerly cathedral in Europe. The architecture of the oldest parts is Norman, but many changes along early English lines were made. The kings of Norway are crowned here. The cathedral contains the tomb of St. Olaf, the national hero.

Photograph by Creté

THE NAVE OF PARIS' GREAT CATHEDRAL

The most striking features of Notre Dame's interior are the rose windows representing Christ and the Virgin surrounded by the prophets, and the celebrated carvings on choir and pulpit. The vaulting is supported by 75 pillars. For an exterior view see page 88.

Photograph by Creté

NOTRE DAME, BESIDE THE SEINE—A TREASURY OF HISTORICAL ASSOCIATIONS

Over the doors are exquisite examples of early Gothic sculpture representing the "Last Judgment," the "Triumph of the Virgin," and events in the life of Saint Anne. The towers are encircled with gargoyles and grotesque monsters that have gazed down at the city for centuries. For an interior view see page 87.

THE EXQUISITE SCULPTURES IN THE CHARTRES CATHEDRAL HAVE BEEN CALLED POINT-LACE IN STONE

In its present form the Chartres Cathedral, which is one of the grandest Gothic edifices in France, was consecrated in 1260. The choir screen, with its 41 sculptured groups representing scenes in the lives of the Madonna and of Christ, was begun in 1514 and completed two centuries later.

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THE CATHEDRAL OF SEVILLE (SEE ALSO PAGE 92)

This is the second largest church in Europe and is one of the richest and most imposing structures in the world (see text, page 112). "Let us erect such a cathedral that posterity shall say we were madmen," reads the resolution adopted in 1401 for the construction of the edifice.

lines are emphasized at the expense of the horizontal—an effect which is due chiefly to the absolutely plain, square masses which form the corners of the tower and extend without a break from roof to parapet. The same motif reveals itself, with even greater emphasis, in the towers which flank the southerly front of the transept.

Additional variety is given to the southwest view of the cathedral by two octagonal structures—a turret stairway built against the wall of the nave at the fourth bay from the transept, and the finely proportioned baptistery, access to which from the church is had through a groined corridor.

The tall traceried windows of the baptistery, with flying buttresses between, surmounted by a rich parapet and a lofty eight-sided roof, render this an architectural gem in itself and a worthy adjunct to the great church which it flanks.

THE WESTERN FRONT

In appraising the architectural merit of a modern cathedral we inevitably and very properly compare it with the superb ecclesiastical buildings which are the sole surviving evidence, on the grand scale, of the architectural genius of the Middle Ages.

They are indeed a priceless heritage for the archeologist and a veritable encyclopedia for the guidance of the modern architect.

If we thus refer to the ancient cathedrals for a measure of the excellence of the Washington façade, we are confronted with an anomaly; for we find that whereas the French architects endeavored to make their fronts a notable feature, if not the noblest, of the whole cathedral, the English, in the majority of cases, seem to have given little thought to the western front and to have been content to erect a rather modest entrance at the side of the nave.

Only at York (page 62), Wells (page 73), and Peterborough (page 78) has an attempt been made to render the western front and its porches a worthy expression of the great structure beyond.

The French delighted in deep and lofty porches, never providing less than three and sometimes as many as five, all enriched with such a wealth of sculpture that it frequently flowed over and spread itself throughout the whole area of the façade, to the very top of its great flanking towers.

Too often the English façades are cold, formal, and altogether inexpressive of the size and rich variety of the body of the church beyond.

And here again we think that the architect of the Washington cathedral has found the happy mean. The lofty central porch, 90 feet in height, and the two side porches, 60 feet high, not only correspond in strict proportion to the nave and side aisles to which they, severally, form the entrance, but by their great height and width, and the fact that they are recessed fully 40 feet beyond the face of the façade, they challenge comparison with Peterborough, the finest of the English examples, and with the justly famous porches of Rheims (page 82) and Amiens (page 83).

The treatment of the western towers is marked by the fine restraint and well-balanced sense of proportion, which characterizes the whole fabric of the cathedral. The embellishment, in the form of statuary and decorative carving, is rich without being excessive.

The buttressing is strong, simple, and so drawn as to emphasize the height of the towers. Moreover (and this marks always the true artist in monumental building), there is an ample and satisfying area of plain, undecorated wall surface.

THE NAVE

The sense of restful satisfaction with which we look upon a perfect architectural work is due to the perfect proportion of its linear dimensions, the nice balance of its masses, and the good taste with which its decorative enrichment is applied. The Washington nave meets each of those requirements.

Entering the nave from the west, the eye ranges through the full length of the cathedral—nave, crossing, choir, and sanctuary—to rest upon the far-distant stained-glass windows of the apse. The long line of stately columns, the rich triforium, the spacious and deeply recessed windows of the clearstory, lift the eye to the unbroken line of the vaulted ceiling, the whole combining to give instantly an

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THE REPUTED CASKET OF COLUMBUS IN THE SEVILLE CATHEDRAL

Most historians maintain that the body of Columbus rests in Santo Domingo, where it was brought after his death in Spain. The bones removed by the Spaniards to Seville when the island was surrendered to the French are, in all probability, those of Diego Columbus, son of the great admiral.

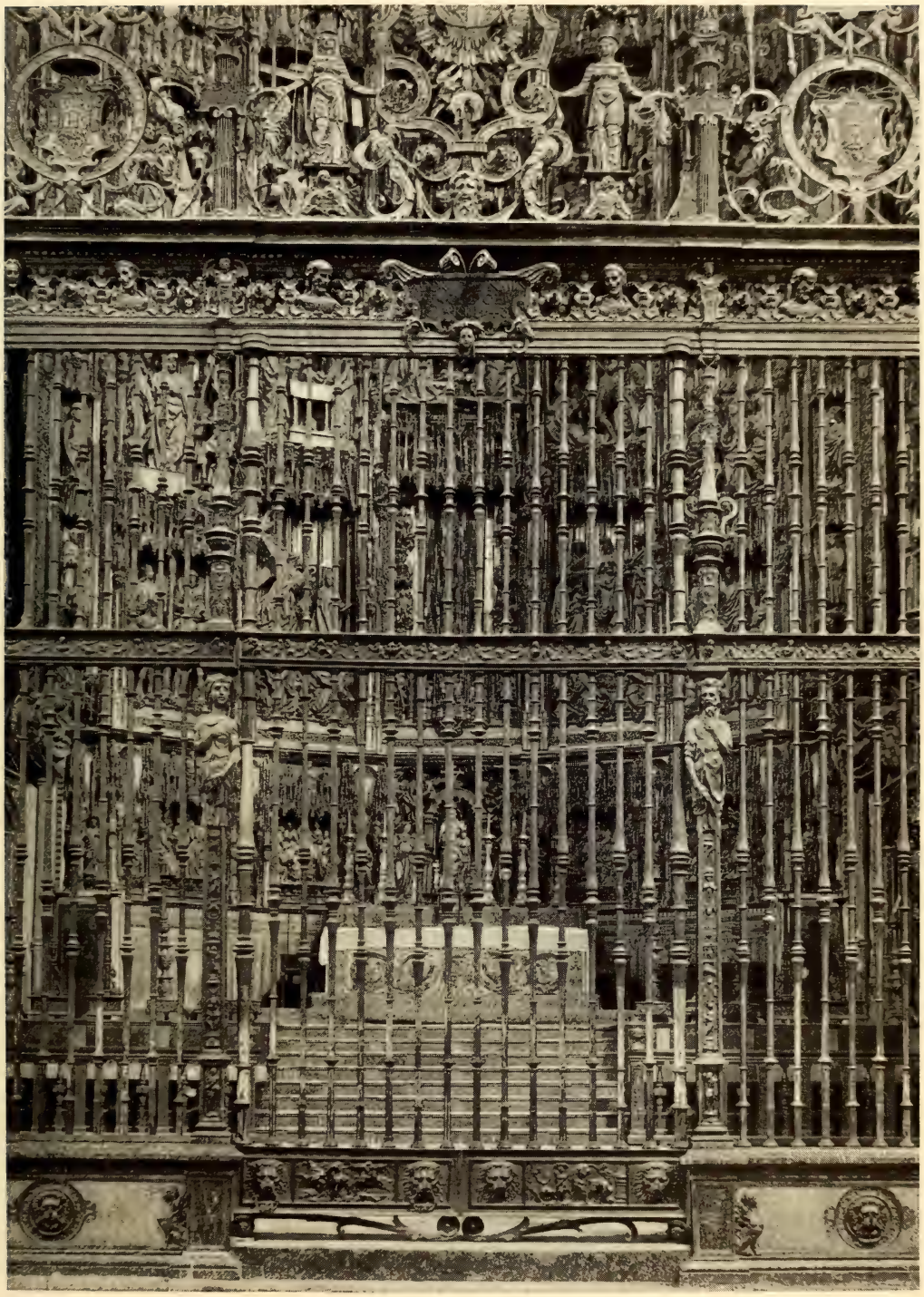
© E. M. Newman

BURGOS CATHEDRAL, SPAIN

Founded in part by an English bishop in 1221, this shrine is one of the most richly ornate examples of Gothic architecture in the world. The octagonal lantern above the central crossing terminates in eight crocketed and perforated pinnacles adorned with statues of angels, martyrs, warriors, and princes. A relic of the Cid, Spain's national hero, is kept here.

THE INTERIOR OF THE CATHEDRAL AT TOLEDO

This view of the nave shows the trascoro, or rear of the choir, a typically Spanish adaptation of the Gothic ideal. The glories of Toledo lie within, not without; the carvings are unsurpassed for beauty and magnificence (see text, page 114).



THE VERJA, OR SCREEN, TOLEDO CATHEDRAL

Behind this exquisitely hammered screen is the High Altar, a small church in itself. A bewildering aggregation of small columns, niches, statues, foliage, and arabesques, painted and gilded with matchless splendor, extends to the vaulted roof and all around the sanctuary.

© Dr. Orrin S. Wightman

ST. ISAAC'S CATHEDRAL, PETROGRAD

The first shrine of All the Russias was begun in 1819. Inside and out, the gigantic proportions, the profusion of marbles, the brilliance of the gilding, the elaborate mural paintings, and the gleam of the polished pavement, produce a dazzling impression of beauty and magnificence. After Pompey's pillar and the column of Alexander in Petrograd, the 48 columns of the four porticos of St. Isaac's, 56 feet high and 6½ feet in diameter, are said to be the largest single stones which the hand of man has cut, rounded, and polished.

Photograph from Publishers' Photo Service

ST. STEPHEN'S CATHEDRAL, VIENNA

The lofty spire of St. Stephen's towers over an almost perpendicular roof made of brilliantly colored glazed tiles, many of which have been used in forming the conspicuous double-headed eagle, the Hapsburg coat of arms. This cathedral, begun in the twelfth century, is the finest Gothic edifice in Austria. In the second story of the tower is the great bell of 1711, weighing 20 tons. Beneath the church are extensive catacombs and the old imperial burial vault.

COLOGNE CATHEDRAL

Founded in 1248, this shrine was not completed until 1880. Its immensity, beauty of proportion, and wealth of decoration are celebrated. "Rows of massive flying buttresses, piers, pinnacles, spires, needles, crockets, towers, mullioned windows, portals, niches filled with figures, carvings, and grotesque gargoyles" produce an astonishing effect. Its twin spires soar to a height of 512 feet.

STRASSBURG CATHEDRAL

This ancient church, which in its present form represents the activities of four centuries, is built of red sandstone. Upon the three noble porches of the façade is recorded in stone the history of the Creation and Redemption. Among the churches of France, its north tower, rising to a height of 465 feet, is exceeded only by that of Rouen (see page 84).

© Donald McLeish

ST. PETER'S, IN ROME, THE LARGEST CHURCH IN THE WORLD (SEE PAGE 111)

Founded by the Emperor Constantine, the majestic edifice owes much of its splendor to Michael Angelo and to Raphael, who were engaged in its construction and decoration. The façade is surmounted by a balustrade with statues of Christ and the Apostles. The piazza in front is inclosed with huge colonnades, each of which contains four series of Doric columns.

© Donald McLeish

THE FAÇADE OF THE CATHEDRAL AT SIENA

Built between 1229 and 1380, Siena's shrine is of red, black, and white marble, richly decorated with statues of prophets and angels. Its façade is considered the finest in Italy. If the plans of 1340 had materialized, the existing building would have been only a transept of one of the largest cathedrals in the world. The remains of the huge nave of this proposed structure are still to be seen.

© Donald McLeish

THE CATHEDRAL AT PISA

This cathedral was built to commemorate the naval victory of the Pisans near Palermo in 1063. It is of white marble, ornamented with black and colored bands. The magnificent façade has been imperfectly imitated in other Italian cities (see text, page 111). Beyond is the Leaning Tower, the scene of Galileo's experiments.

© Donald McLeish

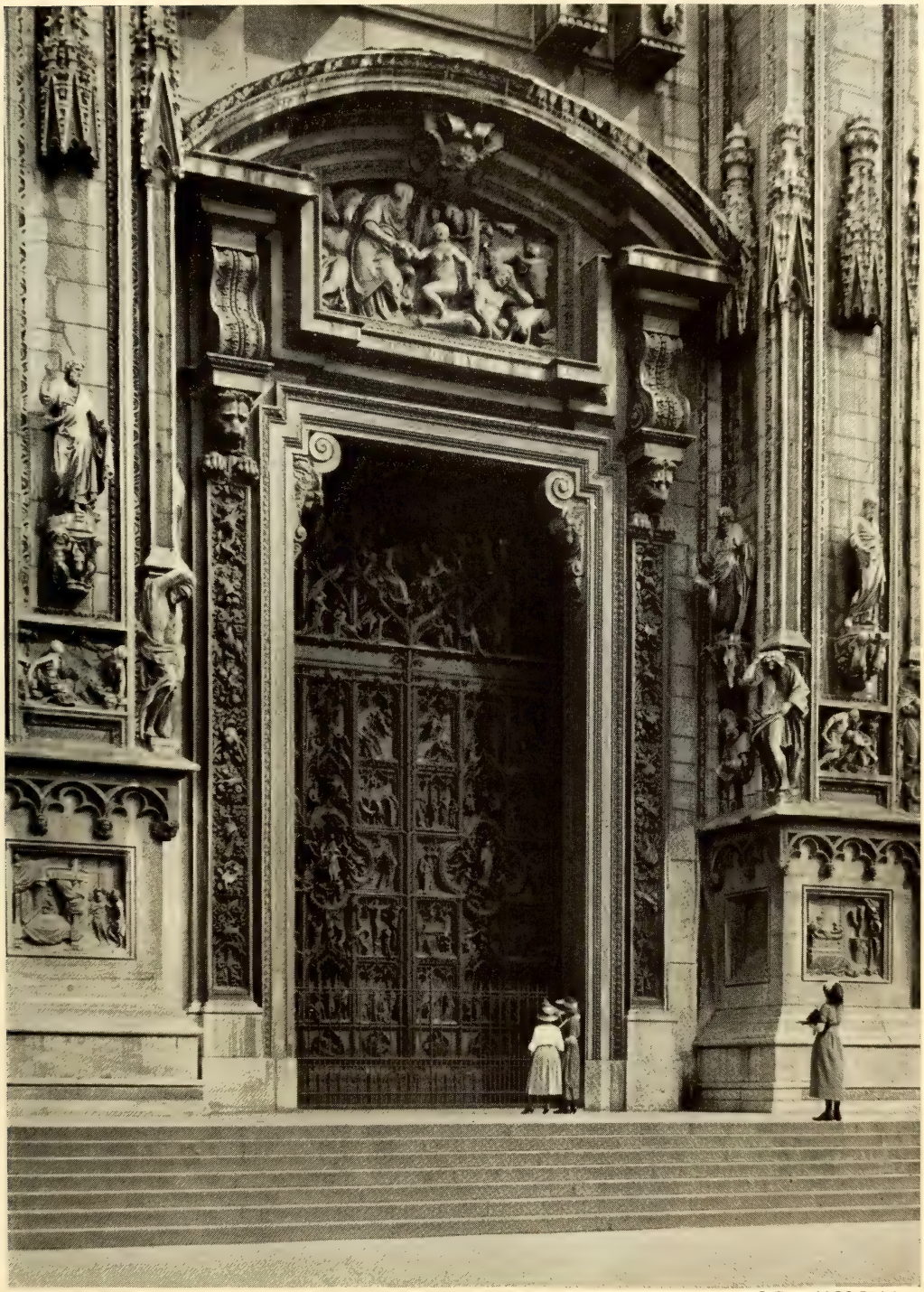
THE MILAN CATHEDRAL

With the exception of St. Peter's at Rome and the cathedral at Seville, this is the largest church in Europe. It is built entirely of white marble. The hundreds of spires and statues adorning the roof make the edifice appear like a huge carving. Begun in 1386, this structure has been proclaimed by many "the eighth wonder of the world."

© Donald McLeish

MARBLE SPIRES RISING FROM THE ROOF OF THE MILAN CATHEDRAL

These pinnacles are decorated with more than 2,000 statues, most of which are hundreds of feet above the streets. All are of marble and of the most delicate workmanship (see text, page 111).



© Donald McLeish

THE GREAT DOOR OF THE MILAN CATHEDRAL, WITH ITS WONDERFUL CARVINGS

The sculptured panel over the entrance represents the creation of Eve. Other scriptural events are depicted in stone on the side panels.

© Donald McLeish

THE MAIN PORTAL OF THE CATHEDRAL OF VERONA

Behind the columns and griffins are rough relief sculptures of Roland and Oliver, the famous paladins of Charlemagne. The nave and Gothic windows of this Romanesque structure of the twelfth century are of a later time. Beside the cathedral rises an unfinished campanile resting upon an ancient base. One of the priceless possessions of the church is a painting of the Assumption by Titian.

© Donald McLeish

THE PIAZZA OF VENICE, THE CHURCH OF ST. MARK, AND THE NEW CAMPANILE

The domes of St. Mark reflect a Byzantine influence. The new Campanile, 322 feet high, is an exact reproduction of the original bell-tower, begun in 874, which fell in 1902. Pigeons are said to have been kept in the square since the crusader Dandolo received valuable information by carrier pigeons while besieging Candia. They were formerly fed at the expense of the city, but are now dependent upon the charity of visitors.

VIEW OF FLORENCE SHOWING THE DUOMO, CAMPANILE, BAPTISTERY, AND THE PALAZZO VECCHIO

The Gothic dome of Our Lady of the Flower is comparable to the Renaissance dome of St. Peter's. It is remarkable for having been constructed without supports or scaffolding. Beside the church rises the Campanile, Giotto's unrivaled bell-tower, faced with many-colored marbles and adorned with statues and reliefs by Donatello and others. To the left is the tower of the historic Palazzo Vecchio, facing the Piazza della Signoria, where Savonarola was hanged on a cross and burned in 1498.

SANCTA SOPHIA, SACRED TO CHRISTIAN AND MOSLEM ALIKE

The total estimated cost of ground, material, labor, ornaments, and church utensils of this historic religious edifice, founded in 532 by Justinian the Great and completed in less than 6 years, was $64,000,000. Contributions came from all over the world, and its collection of priceless marbles, gold and silver vessels, and precious stones is unsurpassed. Legend says an angel revealed to the Emperor Justinian the plan for the mammoth dome.

THE "ST. PETER'S" OF MEXICO

The foundation of this massive structure of basalt and gray sandstone is composed almost entirely of sculptured Indian images and some of the remains of the great Aztec altar, or Temple of Sacrifice, that stood near by. It contains an original painting by Murillo, "The Virgin of Bethlehem." Among the peculiarities of the structure are the bell-shaped domes of the twin towers, which rise to a height of 203 feet.

impression of mysterious solemnity and majestic repose.*

FRANCE AND ENGLAND JOINTLY RESPONSIBLE FOR GOTHIC STYLE

The Gothic style found its most perfect expression in the French cathedrals of the thirteenth century and the English of the fourteenth, the French developing later the luxurious Flamboyant and the English the rigid but stately Perpendicular style.

Although France and England were conjointly the birthplace of Gothic, the new style exercised, as it was bound to do, a profound influence upon church architecture throughout the whole of Christendom, and notably in Italy and Spain. In each country it was modified by the climate, and bore the impress of the historic associations and the artistic tastes of the peoples among whom it was introduced—so much so, indeed, that we have come to speak of Italian and Spanish Gothic as individual types in cathedral architecture.

When the fires of persecution died down, and the early Christians of Rome were free to worship as they would, they found in the Roman Basilica or Law Court, with its central nave and side aisles, a building well suited to their simple form of service. To the Roman Basilica, therefore, we are indebted for the general plan of the Romanesque churches, of which Italy contains so many fine examples. These are characterized by the use of the round arch for door and window openings, and by the modified classic character of their details. Famous among such churches are St. Paul's Without the Walls at Rome, and the smaller but more beautiful cathedral at Pisa (page 102), whose blind arcades, open galleries, and many-colored marbles render its exterior one of the most elegant among the ancient churches of Italy. The oriental influence upon early Italian church architecture is seen in the use of the domical roof, as in St. Mark's at Venice (page 107), whose five domes and general treatment are suggestive of the Christian churches of the Byzantine Empire.

In spite of the natural preference of the Italians for the classic forms, to which they were drawn by the ties of a proud tradition, it was inevitable that the splendors of the new Gothic style would appeal to the artistic feeling and stimulate the rivalry of Italian architects. But in making use of the new style, they left upon it the deep imprint of their own traditions and tastes. Their genius for painting, carving, and sculpture led them to depend as much upon these arts as upon architecture for effect.

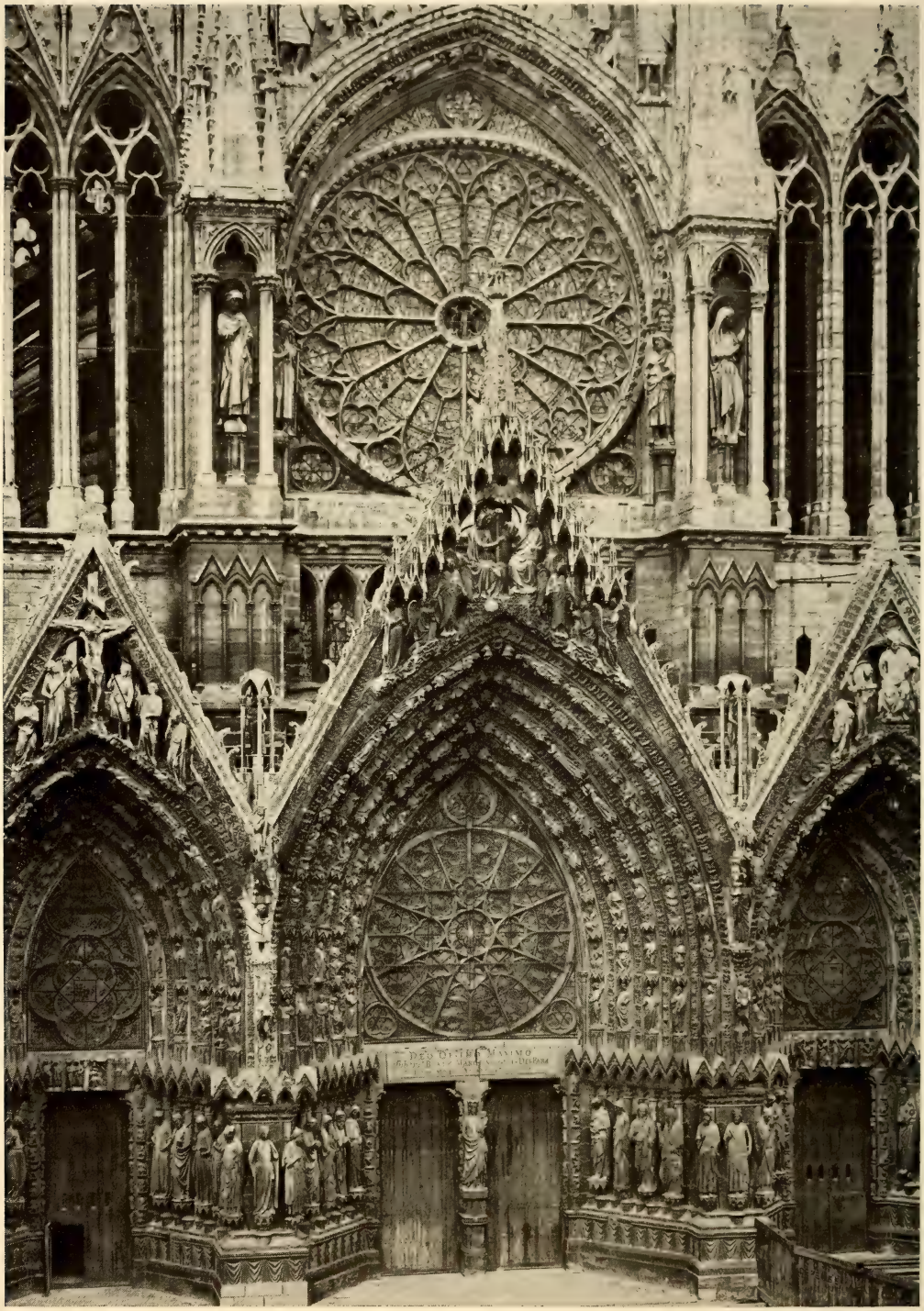
Partiality for the classic forms, moreover, caused them to include these, in modified form, not only in the details but sometimes, as in Milan Cathedral (pages 103, 104, and 105), as a main feature of the church itself; for here we have a Gothic church with a Gothic-Renaissance façade.

MILAN CATHEDRAL BUILT OF MARBLE

Milan has the distinction of being the third largest church in Christendom, a position which it will ultimately yield to the Church of St. John the Divine, at New York. Its nave is of vast proportions, being 60 feet wide and 150 feet from the floor to the apex of its vault. Milan has the distinction, moreover, of being built entirely of marble, and it is thoroughly Italian in the superabundance of its carving and sculptural adornment.

The Italian architects never seem to have been quite at home when working in the Gothic style; and when Pope Nicholas called for the erection of a church, upon the banks of the Tiber, that should transcend in size and magnificence the temples of all lands and of every age, the master architects of the day returned to their first love, and, working in the forms and using the orders of ancient Rome, they built the great Renaissance Church of St. Peter. So vast is this structure that it stands in a class by itself. With a total length of over 700 feet, it covers a ground area of 230,000 square feet. Next to it in size is the Spanish Gothic cathedral at Seville, with an area of 128,570

*In a subsequent issue THE GEOGRAPHIC hopes to present a detailed description of the National Shrine of the Immaculate Conception, another majestic religious edifice designed for the National Capital, the cornerstone of which was laid on the grounds of the Catholic University, September 20, 1920, and which, it is anticipated, will be completed within 30 years.



Photograph by Creté

DETAILS OF THE WEST FAÇADE OF RHEIMS CATHEDRAL

The west façade of this church, "perhaps the most beautiful structure produced in the Middle Ages," is the supreme example of elaborate decoration in the early Gothic style. The sides and overhead vaulting of the three recessed portals and the gables above them are beautifully adorned with sculptures and carvings. (Photograph made before the damage done during the World War; see also page 82.) The façades of the cathedrals of Notre Dame, Tours, Amiens, Strassburg, and Lichfield are similarly embellished.

© Donald McLeish

A LEERING GARGOYLE OF NOTRE DAME

Hobgoblins, chimæras, and quaint little beasts in stone are among the most fascinating features of the sculptural adornment of the Paris cathedral. This particular demon seems to be in a morosely pensive mood as he surveys the gay capital where he was wont to work such mischief before his capture.

square feet, followed by Milan Cathedral, with an area of 107,000 square feet.

The nave of St. Peter's is 100 feet wide by nearly 150 feet high; the great dome, internally, is 135 feet in diameter, with a clear height of 333 feet.

Italian Gothic may lay claim to having produced in the cathedral of Florence one of the greatest churches of the world (page 108). The genius of the Italians in the construction of domes has crowned this church with the noblest Gothic dome in existence, the octagon being 136 feet in diameter and 375 feet to the top of the external cross. Near by stands the lovely, marble-encased campanile of Giotto, regarded by many critics as the finest example of that tower construction in which, whether working in Romanesque or modified Gothic, the Italians excelled.

SPANISH GOTHIC WAS AN IMPORTATION

Spanish Gothic, like that of Italy, was an importation; and although in the period of its greatest development it was superior to the work of the Italians and more true to type, it bears, like the Italian, the strong imprint of national tastes and predilections, especially in its decorative enrichment.

At the time when the Norman bishops were covering Saxon England with their stately, round-arched, Norman cathedrals, Christian Spain, having shaken off the Moorish yoke, was actively engaged in erecting churches on a style that was not widely dissimilar to the early Norman.

Like the Norman, the early Spanish form of church probably was an introduction from France. Beginning as a round-arched style, it later adopted the pointed arch and assumed Gothic characteristics.

This early Roman-Gothic was simple, but bold and dignified. Perhaps its most distinctive feature was the development of the dome at the intersection of nave and crossing. The Spanish architects excelled in this construction, and have left some notable examples of their skill.

The finest examples of pointed Spanish Gothic belong to the "Middle" period, which lasted from about 1225 to 1425. Three of the notable cathedrals of the world, Toledo (pages 94 and 95), Burgos (page 93), and Seville (pages 90 and 92), belong to this period. The cathedral at Toledo, begun in 1227, a few years after the founding of Amiens, was designed to surpass that masterpiece in size and magnificence. Hence, everything is on the grand scale; and in area it exceeds every French cathedral, though its interior height is far below that of Amiens, Rheims, or Beauvais.

Externally, the architectural result is disappointing and not to be compared with the great French examples. The glories of Toledo lie within, not without. Its impressive interior, made up of five aisles with the unusual total width of 178 feet, is enriched with such a wealth of carving and statuary, wrought in the distinctive Spanish manner, that the result is bewildering and scarcely in keeping with the simplicity of true Gothic.

In Burgos the conditions are reversed; for, unlike Toledo, this church shows to best advantage from without. Although it is not a large church, as cathedrals go, Burgos is admitted to present one of the finest architectural exteriors in the whole range of Gothic architecture. The western towers, crowned with open-work spires (reminiscent of Cologne, page 98), with the richly-decorated octagons above the crossing and above the chapel at the eastern end, combine in a harmonious grouping, the picturesque beauty of which has never been questioned.

SEVILLE HAS LARGEST GOTHIC CATHEDRAL

The Cathedral of Seville (page 90) carries the distinction of being the largest and in some respects the noblest of all the Gothic cathedrals. Its plan, a parallelogram, 415 feet long by about 300 feet wide, followed that of a mosque which was torn down to make way for it. The area covered is about 123,000 square feet. No other Gothic cathedral approaches these dimensions. Not only is the central aisle nearly 60 feet in width, but flanking this, on each side, are two side aisles and a row of chapels, each 40 feet in width and therefore equal to the nave of most English cathedrals. The interior height is in proportion, and the whole effect of the many lines of massive columns is impressive to a degree that is not surpassed, in the opinion of many critics, by that of any other medieval Gothic cathedral.

Vol. XLII, No. 2 WASHINGTON August, 1922

THE NATIONAL GEOGRAPHIC MAGAZINE

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DENMARK AND THE DANES

By Maurice Francis Egan, Litt. D.

American Minister to Denmark, 1907-1918

STOCKHOLM, the capital of Sweden, rather prides itself on being the "Paris of Scandinavia," largely because of its architecture and its modernness; but the Danes, admitting with pride that Copenhagen is not altogether a modern city, rather claim that they are more like the Parisians than their neighbors in Sweden.

There can be no question that Copenhagen, so far as the street life in the center of the city is concerned, is extremely gay. The Danes like to dine in cafés, or, when the weather is pleasant, in the open street. It is quite true that if one knows enough Danish to understand scraps of conversation heard at random, he will soon discover that the amiable Dane is very fond of his food, and that all questions of the table have much importance to him; I am not a master of the Danish language, and once I listened to a conversation with great interest and some understanding.

My vocabulary was not at that time large. I caught the names of "the Duke of Cambridge" and "the Duke of Cumberland," and I was oppressed with the seriousness of the speakers. It seemed to me that some momentous political question was being discussed. My companion, a very distinguished Dane, suddenly joined in the talk; it was in the garden at Klampenborg, where five or six children, with their father and mother, were treating themselves to some drops of cognac in small cups of black coffee.

The talk became animated. As a diplomatist, I was interested in the matter of the Hanoverian succession, which intimately concerned the Duke of Cumberland. Why the Duke of Cambridge should be brought in I could not say. I thought I heard the name of the Kaiser, too—this was before the war; but after a period of tense attention on my part, my companion interpreted the discussion for me. It had centered around the question as to whether the Duke of Cambridge or the Duke of Cumberland had really invented the famous Cumberland sauce, without which boiled ham in Denmark is not considered to be really ham at all. And the opinion of the Kaiser had been invoked.

The Danes, unlike the English, do not take their amusements seriously; nevertheless, they look on amusement as a very serious and necessary part of life. I recall that one day, walking with a Danish officer, I saw a man hurrying into his apartment—very few people have houses in Copenhagen—and I said, "That is an edifying spectacle. See how that good husband and father rushes, after his business, to meet his family!"

My friend gave me a glance of astonishment and looked at his watch. "He is five minutes late for dinner; that is the reason of his haste!"

One of the charms of Copenhagen, indeed, of Aarhus, of Odense, and of all the other Danish towns, is that the business of life is carried on with cheerfulness.

Photograph from Ewing Galloway

THE FREE PORT OF COPENHAGEN IS THE GATEWAY TO NORTHERN EUROPE

© E. M. Newman

COPENHAGEN FROM THE TOP OF CITY HALL TOWER

More than one-sixth of all the people of Denmark live in their capital city, whose population is a fourth larger than that of Washington, D. C.

Photograph from W. W. Rock

THE ROYAL THEATER IN COPENHAGEN

Bronze figures of Holberg, who made his people laugh at their own follies, and Oehlenschlager, who made the old Norse gods and heroes live again, stand at the entrance to greet the visitor to this majestic building.

Photograph from Emil Opffer

ABSALON'S STATUE IN THE HOJBRO-PLADS, COPENHAGEN

Absalon was an archbishop and statesman who wielded both his fighting arm and his Bible in behalf of his country. The square in which this equestrian statue by Bissen stands is a lively one during market hours.

Photograph from Emil Opffer

COPENHAGEN'S RAADHUS, OR TOWN HALL

In the tower there is a fine set of chimes and underneath a great glass roof there are extensive inner courts. To the left are two of the city's largest hotels.

Photograph from Emil Opffer

DENMARK'S BOURSE

Built in the Dutch Renaissance style, the Copenhagen Exchange dates from 1619. The tower, which is 167 feet high, is formed of four entwined green copper dragons. This is one of the most admirably proportioned buildings in northern Europe.

Photograph from Wide World Photos

A ROYAL PROCESSION IN COPENHAGEN

King Christian, accompanied by Queen Alexandrine, is seen leaving the Capitol after opening a session of the Danish Parliament.

Work for work's sake is not the aim of the Dane. He works well, but he neither works restlessly, nor nervously, nor constantly. Work with him is not the end of life, but a means of living; and the Danes, as a rule, enjoy the work in which they are engaged.

If the Danes eat a great deal, they do not drink more than other people, and they seldom drink without eating. Although Denmark has not made prohibition a law, yet the government has managed to raise the price of alcohol, and even the Danish schnapps, which was formerly almost as cheap as water, is now worth about four dollars a bottle, according to the present rate of exchange. This is a good thing, for schnapps was the bane of many a working man's family.

As a rule, the evils brought about by the saloon in this country do not exist, and while beer was looked on as a necessary article of diet, it was consumed in moderation.

It must be admitted that the Danes are sometimes unjust to the Swedes. One was invariably informed that there were really no drunkards in Denmark, and if one pointed out occasionally a staggering figure or two, the explanation was made at once, "Oh, he's a Swede!"

Sweden and Denmark are very close together, being separated only by the Sound; and the virtuous Danes generally attributed any exuberant gaiety induced by spirits on Saturday nights to the invasion of Swedes, in whose country the laws governing the use of alcohol were very strict.

DANES THINK AMERICANS TOO CONSERVATIVE ON DIVORCE QUESTION

There is a general impression that divorce and remarriage are very easy in Denmark. It is true that the radical government, especially when Alberti was Minister of Justice, made the annulment of marriage too facile. But there is no reason to believe that, in proportion, there are more divorces and remarriages in Denmark than in this country.

Among the radicals who have thrown off the traditions of the Lutheran Church, marriage is not looked on as a serious matter; and Americans are regarded as entirely too conservative in regard to marriage.

Difficulties, owing to what may be called "trial marriages," sanctioned by the state, do occasionally occur. In one case a distinguished lyric poet, for whose work I had a great admiration, died. I sent two telegrams and a wreath for his grave to his wife. The first telegram reached his first wife, the second his third wife, and the wreath the second wife.

The Danes will brook no corruption in their government if they can possibly prevent it. They are extremely jealous of the national honor; no political power or prestige will save a man in office from punishment if he has betrayed his trust.

The case of one of the cleverest men in Denmark—Alberti—is an example of this. No man was more admired, no man more trusted, in spite of what may be called his unmoral ideas as to the conjugal relation. The time came, however, in 1908, when he was accused and found guilty of the misuse of money. The axe fell; he was imprisoned and no mercy was shown him, although a month before his incarceration he had been covered with decorations and stood very high in the estimation, not only of the Danes, but of those European statesmen who had come in contact with him.

SOCIAL BASIS OF LIFE IN AMERICA NOT UNDERSTOOD

It is regrettable that in none of the three Scandinavian countries is the Constitution of the United States and its workings, or the social basis of our life, well understood. The American-Scandinavian Foundation, which has been in existence for nearly fifteen years, has done much to make the culture and the point of view of the United States known in Denmark, Sweden, and Norway; but, unfortunately, only the sensational articles in our newspapers are reproduced in the Danish press. Our cultural life, our economic life, and the moral canons which guide us are scarcely known at all by the body of the people.

When former President Roosevelt came to Denmark, the ultra-radicals expected that he would announce opinions which were socialistic, communistic, or at least

Drawn by James M. Darley

A MAP OF DENMARK

Denmark is almost exactly twice the size of the State of Massachusetts. Four-fifths of its area is productive, yielding crops of wheat, rye, barley, oats, potatoes, and garden produce. More than 15,000 vessels are engaged in the Danish fisheries.

destructive to the foundation of a fairly conservative social system. They were deeply disappointed to discover that he was neither in sympathy with communism, destructive socialism, spoilation of the well-to-do for the benefit of the idle, nor with any of those extremely "advanced ideas" which have adherents in Denmark, and in every other Continental country, and which are attracting the thoughtless in our country and in England,

On one occasion a young man of talent, the president of a small and very "advanced" literary club, came to see me at the legation. He announced that he and his coterie were about to publish several small volumes celebrating certain distinguished women of the modern world. He himself had spent several weeks in the United States and intended to write about an American woman, and, as I had been sympathetic with the young author,

he decided to dedicate the book to me. Prudently, I asked the name of the heroine who was to be the subject of his volume. "The American Cleopatra," he said proudly, naming a young woman at that time the central figure in a notorious murder case in New York City.

This is not really so absurd as it seems, for, during several months, the Danish newspapers had copied from the American journals the reports of the scandalous occurrence. It had blotted out, in the opinion of many foreigners, owing to the space that our newspapers gave it, every other subject of interest!

It is very hard to dispel the effect of a tradition which exists in our country, that Scandinavia is made up of a people thinking alike, believing alike—politically and socially—practically one, and with similar national aspirations. When we speak of Scandinavia we think, as a rule, of three countries—Sweden, Denmark, and Norway—as we would think of three New England States, containing inhabitants speaking the same language and actuated by similar fundamental ideas.

It comes with rather a shock to many persons, who take their geography casually from the surface of the maps, that these three Scandinavian countries have not very much in common, except their ancestry.

The bases of their languages are similar, but a Dane does not find it always easy to read Swedish, while he does find it easy to read Norwegian. There is a great party in Norway, however—a party which has gained some political power—pledged to the substitution for modern Norwegian of the ancient tongue spoken by the Vikings.

For many years there was no love lost among the three countries. In 1397 they were united for a brief period by Queen Margaret, who, by the Treaty of Kalmar, joined them into one great Scandinavian kingdom. At this time she was already Queen of Denmark and Norway, and the Swedes were so impressed by the results of her energetic administration that they united with the other two countries; but the union was dissolved after her death, under the reign of her nephew, Eric of Pomerania.

In Sweden, women enjoyed certain voting privileges earlier than in any other country; and one cannot read her history without being impressed by the influence of such women as Saint Birgetta, who taught the Swedish women to make lace, the patterns of which are still retained; Kristina Gyllenstierna, and Ebba Brahe, one of the best administrators of her time, who did much to introduce effective methods of agriculture into Sweden.

SWEDEN AND DENMARK LONG HEREDITARY ENEMIES

Sweden and Denmark were until recently hereditary enemies. The Castle of Kronborg, which in the tragedy of *Hamlet* takes the name "Elsinore" from the little town (Helsingör) near it, was built, or rather rebuilt, by Christian IV of Denmark, who was contemporary with Elizabeth and with James I of England. He erected it to frown upon the Swedish shore, as well as to exact tolls from passing ships.

Sweden and Norway were alternately friendly and unfriendly; the unfriendliness culminated in 1905 with the secession of Norway from Sweden. For a short time Sweden threatened war and began to mobilize her army; but the Scandinavians have one quality in common; they possess an unusual portion of common sense, and it was decided to let Norway go rather than court the unnecessary evils of war.

Norway chose as king the son of Frederick VIII of Denmark, who was the son-in-law of Edward VII of England. He took the name of Haakon. This proceeding enraged the Swedes, who saw the rule of their own King Oscar, descendant of the French General Bernadotte, replaced by a Dane.

The dislike of the three countries for one another awoke again, but a desire for common safety during the late World War induced them to join in certain agreements, ratified by meetings of the three kings at Malmö, to stand by one another if they were attacked in a military or commercial way.

DENMARK'S RULER RELATED TO MOST MONARCHS OF EUROPE

It is no unusual thing for Denmark to give a king to another part of Europe. A glance at the pages of the revised *Almanach de Gotha* will show that the

Photograph from Ewing Galloway

KING CHRISTIAN X TOWERS ABOVE HIS PEOPLE

The democratic Danish monarch (in the center of the picture, followed by an officer) is one of the tallest men in his kingdom.

Photograph by Ewing Galloway

DENMARK'S RULER IS A GOOD SAILOR, TOO

Danish navigators, such as Vitus Bering, have had a generous share in the making of America's map.

Photograph from Ewing Galloway

CITY HALL SQUARE IN COPENHAGEN ON CHILDREN'S DAY

Every year a day is set aside for concerts and pageants given to raise money for welfare work among the children throughout the kingdom.

present King of Denmark, Christian X, son of Frederick VIII and grandson of that clever Queen Louise, who earned the name of "the maker of royal marriages," and, according to Bismarck, "the cleverest man in Europe," is related to nearly every crowned and uncrowned monarch in Europe except the Pope and the Sultan.

He is the cousin of the present King of Greece, the brother of the King of Norway, the cousin of the Queen of Norway, the cousin of the late Tsar of Russia, the brother-in-law of the late Crown Prince of Germany, the cousin of the King of Sweden, and, through the marriage of his uncle, Prince Valdemar of Denmark, with the daughter of the late Duc de Chartres, he is *parenté* with the Bourbons in all their French, Italian, and Spanish branches, and, through his English connections, "kin" to the Queen of Spain!

It is no wonder, then, that Copenhagen, the capital of Denmark, has been known, since Princess Alexandra married the then Prince of Wales and her sister married the father of the late Tsar, as the royalest court in Europe.

It does not follow from this that the Danes themselves are an aristocratic nation or not in love with real democracy. Even their highest classes in the social scale are much less aristocratic than Swedes of the same rank, and almost as democratic as the Norwegians, who are probably the most democratic people in the world.

A LAND OF COÖPERATION

Denmark is, above all, a land of cooperation and a land whose people are very highly civilized. In fact, no people existing are more literate, more interested in things of the mind, or more advanced socially than the Danes.

It may seem strange that the royalest court of Europe should exist in a country which is largely constructively socialistic. It seems even stranger to us that the farmers in Denmark, who are the most influential part of the population, should take to socialistic methods.

It does not follow, as it does in Sweden and in Germany, that socialists in Denmark should hate a king. They are sometimes in conflict with the existing governments and would doubtless use all their influence to obtain a republic if nearly all that can be gained through the application of democratic ideas to government had not been already achieved.

In truth, in Denmark, under a very liberal constitutional monarchy, the government has become so much a part of the people that it is *their* government. This has, in the eyes of the more conservative Danes, some disadvantages just now, as the present government exists mainly for the poorer classes.

When one speaks of socialism in Denmark, one does not mean exclusively the Socialistic Party. What is called the Socialist-Radical Party is second in numbers in the state; but the moment any party in Denmark ceases to work in the upper and lower houses—the Landsting and the Folketing—for the general good of the farmers, the electors act at once and the party is fused into a minority.

CONSTITUTIONAL MONARCHY AT ITS BEST

There is one especially admirable quality that strikes the observer in Denmark—that is the capacity of the Danes for "team-work." When it comes to the question of a reform which the people have thought about and have come to the conclusion that they need, there is no time lost in putting it into activity. To think, among Danish folk, is to act. In this they are unlike their favorite hero of tragedy, Hamlet.

It is refreshing, too, to discover that no great affair concerning the good of the people is undertaken thoughtlessly, and the Crown does not oppose in any way reforms that may lessen its privileges or prerogatives.

King Christian X is a Dane of the Danes, and yet sympathetic and tolerant of the legitimate claims of other nations; and in Denmark one sees a constitutional monarchy at its best. Whatever one's prejudices and traditions may be, one is forced to admit that a constitutional monarchy under such circumstances is an ideal institution, especially for a small state.

The population of Denmark is about 3,049,000. The statisticians have not included North Schleswig, recently returned, under pressure, by Germany, in this calculation. The area of Denmark

Photograph by Maurice P. Dunlap

SINDING'S VALKYRIE BRANDISHES HER SPEAR IN MODERN COPENHAGEN

This warrior maiden of Northern folk-lore stands at the entrance to Langelinie Park, where the northeast wind and the sunbeams, which, in Hans Christian Andersen's story, fight over the infant Copenhagen, still have their "fling" at her. Many of Copenhagen's statues reveal traces of the old Viking spirit still lingering in the modern Dane.

is 15,586 square miles; it is one-twentieth the size of Texas and about one-third the size of New York State.

North Schleswig is computed to contain 1,507 square miles, and the addition which its acquisition has brought to Denmark would make the whole population about 3,220,000. The Faröe Islands are part of the Kingdom of Denmark. Iceland, which formerly belonged to Denmark, became a free state in 1874, rather gently ruled by the King of Denmark.

The Danish West Indies, now the Virgin Islands, were bought by the United States in 1916 for strategic purposes, and they now form a very important part of the defense of the Panama Canal.

Greenland is the only colony that Denmark now possesses. It is, in fact, a monopoly of hers; and so far it has not proved a valuable one.

AGRICULTURE THE CHIEF INDUSTRY

Denmark is almost exclusively devoted to agriculture; and yet not many more than 1,000,000 persons follow the pursuits of agriculture, forestry, and fishing. This is shown by the statistics of 1911. The capital, Copenhagen, is a city too large in proportion to the population of the country; it contains 575,000 persons. Aarhus comes next, with 65,000; Aalborg has 35,000, and Odense, 40,000.

To be as exact as possible, there are 250,000 farmers in the country, formed into 4,000 coöperative societies, which permeate all the economic relations of life. These coöperative societies are the proprietors of all the machinery for buying all that the farmer needs and distributing all that he produces and does not consume himself.

There is no graft; no middleman can "corner" any articles of necessity; there are no multi-millionaires, with excess profits gained from home industries. In fact, the Dane who would declare that capital is the enemy of labor would be looked on as an economic idiot, just as it would seem equally idiotic to assume that labor existed for the piling up of capital.

In Denmark, money is not an end; it

© Ewing Galloway

WHERE POTTERY-MAKING IS A FINE ART

Women decorate the pottery in the beautiful studios of the Royal Copenhagen works. Each piece of porcelain is decorated by hand and the ware has never been commercialized.

is an instrument, a medium of circulation. And the object for which all parties in politics are struggling—the conservative in Denmark would be looked on as radical here—is that it should be equally distributed, not for luxuries, but for necessaries.

Other countries have begun to imitate the admirable system of farmers' banks, and the success that Sir Horace Plunkett has had in Ireland—a success which would have been greater if the Irish people had the capacity, as the Danes have, for team-work—owes most of its value to his careful study of the agricultural coöperative processes in Denmark.

The first Irish technical report on agricultural coöperative conditions in Denmark is a model for serious study, and time has not dulled its applicability.

Prussia despoiled Denmark in 1864; and while Imperial Germany grew more threatening to the liberty of Denmark every year until the close of the World War, the Danes were not hampered in any way, as the Irish were, by foreign control; consequently they had not the same temptation to emigrate. With some exceptions, they remained in their own country.

THE DANES A PROUD AND PATRIOTIC RACE

About the middle of the nineteenth century the Danish people, if they had had less love of their own land and less power of cohesion, would have deserted Denmark. Everything seemed to be against them. Serfdom had ceased, it is true, and the dawn of social equality was beginning.

But they had not yet recovered from the blow struck at their national pride early in the nineteenth century, when their fleets had been destroyed by the British. Yet this was as nothing compared with the tearing away of their most cherished province, Schleswig-Holstein, by the Prussians, assisted by the Austrians, in 1864.

The Danes had desired to conquer no other nation; their only wish was that they should retain their own language, their own literature, their own music and art—in a word, their national "culture."

Their religion was never in danger,

Photograph from Ewing Galloway

UNIVERSITY STUDENTS ON THEIR WAY TO LECTURE HALL

The University of Copenhagen was founded fourteen years before Columbus discovered America. Though Denmark believes in higher education for women, before a girl marries she is also taught how to keep a house and cultivate a garden.

© Ewing Galloway

PARADE OF BOY SCOUTS IN DENMARK

Prince Knud, the second son of the King, is seen at the extreme right of the photograph.

Photograph from Ewing Galloway

IN THE MUNICIPAL STADIUM OF COPENHAGEN

The Danish capital is proud of its pseudonym, "the modern Athens." Here the country's best athletes compete in sports which closely follow those of ancient Greece.

although the Lutheran Church in Denmark is less rigid, less Calvinistic than the same church in Prussia; but in Schleswig the Imperial autocrats forbade that the Danish language should be used in the Lutheran churches and schools; and this, in Danish eyes, in which Lutheranism was a national religion, was almost equivalent to the extirpation of their church.

Until the middle of the nineteenth century the Danes were brought to the verge of ruin by a stupid system of agriculture, only comparable to that in vogue in some of our cotton-raising States, where the same old crop destroys the nutrition of the soil and the boll-weevil eats its fruits. Scientific agriculture was unknown to them. The growing of grain was a fixed dictum, and rotation of crops a heresy.

In our practical life we are willing to assume theoretically the preëminence of mind over matter; but, in spite of our constant assertion, we are surprised when we discover that mental axioms, religious precepts put into action, may become the safest foundation for practical progress, in a nation which believes that ideals must rule.

DENMARK'S NATIONALITY PRESERVED BY GRUNDTVIG'S EDUCATIONAL SYSTEM

Denmark was at its lowest in 1870, apparently, though the ideas of Bishop Grundtvig had already begun their seminal work.

Nikolai Frederik Severin Grundtvig was the economic and social savior of Denmark. He was of the prevailing state religion, the Lutheran, but he was entirely out of sympathy with the breaking of the best traditions of Denmark, which connected it with the Middle Ages, with the times of Bishop Absalon and King Valdemar.

Religion in Denmark had become too formal. It had little vitality and very little connection with the national life. Again, the system of education, or rather of instruction, which it fostered was, to his mind, inadequate. The church, it seemed to him, was a caste, and it educated and cultivated only the people of the aristocratic classes, among whom German was the prevailing language.

They were very much Germanized; they rather despised the glories of Danish history and the beauties of its language. The Lutheran Church had been Germanized, too, and Grundtvig, a clergyman himself, determined to save its people through a system of education which would make the poor man self-controlled, practical, patriotic, and able to use his knowledge for the betterment of his country and himself.

This he slowly accomplished; and in 1880 his design had so much matured that the Danes, through his treatment of their own mentality, were beginning to be a self-respecting, hopeful, and prosperous people. This was about eight years after his death.

This was largely done through the system of high schools he founded. There are Danes today who disdain the high-school system, and who seem to think that no bishop—even a bishop disapproved of by his church—could under any circumstances be responsible for the fortunate condition in which Denmark finds itself today.

Although there is no difference in doctrine between the Lutherans in Denmark and those in the United States, the churches here are more independent. One reason, perhaps, why there are no bishops in the Danish church here is that the Lutheran ecclesiastics in Denmark are officials of the state, and their jurisdiction could hardly be made to extend in this country, and none have been nominated from the American Danish church.

Denmark is by no means an earthly Eden. Poverty exists, less sordid than in most countries, and industrial unrest exists; but if there is anything in modern democratic ideals, the Danes have discovered that thing and applied it, largely through the impetus given by this remarkably sane, patriotic, and truly religious man.

In the first place, he realized that everything depended on the spirit of the people. Material misfortunes naturally induce pessimism, and the Dane, when deprived of cheerful surroundings or the stimulus of effort, is a very melancholy person; and during the late autumn and all of the winter the climate in which he lives is one of the most depressing in the world.

The percentage of suicides in Denmark was at one time very great, and the Dane himself is quick to recognize the fact that

Photograph by Maurice P. Dunlap

A BICYCLE PARTY STOPS FOR REFRESHMENT AT AN ICE-CREAM STAND

Bicycling is one of the most popular sports in Denmark, and it is said that everybody rides, from the King down. In the narrow streets policemen must be stationed to regulate the traffic. There is little snow in Denmark and bicycles are used the year round.

he has much of Hamlet in his composition.

Until I spent some years in Denmark, I believed that Shakespeare's creation of Hamlet—founded on the Hamlet legend of the Danish historian, Saxo Grammaticus — represented a second-rate philosophical mind, English of the sixteenth century, battling against circumstances; but I soon realized that Shakespeare's Hamlet was a Dane; and more, also, that, whether it was through the intuition of genius or through experience, Shakespeare had come to understand very clearly the condition of Denmark and the Danes in the sixteenth century.

DANISH HISTORY AND TRADITION OF SHAKESPEARE'S "HAMLET"

In parentheses, I may say that Rosencrans and Guildenstern were really attachés of the Danish diplomatic establishment in London during the reign of James I.

In the rearrangement of territory, dependent on one of the frequent quarrels between Sweden and Denmark, the Guildensterns are now Swedish. Their castle is not very far from the shores of the Sound which divides Denmark and Sweden, and which at one point, that of Elsinore, can be crossed by a good swimmer. In fact, that part of the Sound between Elsinore and Hälsingborg is frequently used as a swimming track in contests.

The family of Rosencrans, now rather large, is Danish. The legend is that in the old days, before the Danish aristocracy had surnames, one of the popes bestowed on the head of the Rosencrans family the title of "Knight of the Rosary" or, rather, "Knight of the Rose Wreath." "Crans" in Danish is "wreath." It will be remembered that in *Hamlet,* on that sad day when Ophelia was borne to her tomb, she was deprived of her "crans" and "maiden strewments."

There is a tradition very firmly fixed in Denmark that William Shakespeare, as a boy, visited the Castle of Kronborg with a strolling troupe, sent for to honor a visit made by James I, who married the Danish princess, Ann of Denmark, sister

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A GROUP OF DANISH GIRL SCOUTS ON A CAMPING TRIP

The people of Denmark make the claim that their Girl and Boy Scouts are the best organized and best trained in Europe. General Baden-Powell, who originated the world movement, has often visited their camps and expressed his admiration of their physical prowess.

of Christian IV. This seems very reasonable; for even the arras, which now is in the museum in Copenhagen, once adorned the halls of the Castle of Kronborg, otherwise "Elsinore." The pictures of various Danish kings are there, with German inscriptions, German being the court language of the sixteenth century, and one naturally looks for the rapier hole in the tapestry which the young Hamlet made when he unwittingly killed Polonius.

THE DANISH THEATER A NATIONAL INSTITUTION

The theater is more of a Danish institution than the opera, in Copenhagen. Both plays and operas are given on the stage of the Royal Opera House, at one side of the spacious King's Market (Kongens Nytor)—a plaza which is only second in attractiveness to that around which the four palaces of the Amalienborg stand.

These fine Renaissance buildings were put up by four great nobles, but afterwards were bought by the crown. Until recently the king and the royal family resided in these palaces, but not long ago the palace of Christiansborg, in another part of the city, was restored; it had been almost ruined by a fire. The king and the parliament have taken up their residence in the halls, to which the fate of Struensee gives a certain romance.

The Royal Opera House is an imposing building. It is a national monument to the love of the Danes for their national theater, and it is the home of the Danish Conservatory, where the ballet dancers, boys and girls, are trained from their youth up. They are carefully looked after and educated in a school of their own.

The Danish ballet, which was brought to perfection by Bournonville in the beginning of the nineteenth century, is different from all other ballets. It is an exquisite mingling of the art of pantomime and the art of the dancer. It always tells a continued story.

Napoli, which the queen-mother of England recommended very warmly to me, is a very beautiful ballet. *Far From Denmark* and *The Millions of Harlequin* have never been reproduced in this country, but they are worthy of reproduction. The serenade in *The Millions of Harlequin* is very beautiful; it was, I think, first played in this country at the White House in Washington, by the United States Marine Band under the direction of Santelmann.

The Danes are very fond of open-air

Photograph from Ewing Galloway

TIVOLI, COPENHAGEN'S FAIRY PALACE

In the evenings, Copenhagen's matchless pleasure palace is the irresistible magnet which draws all the city to its portals. Among its many attractions is the quaint little pantomime theater, where, before the stage, in lieu of a curtain, a gorgeous peacock spreads his tail.

Photograph by Ewing Galloway

COPENHAGEN HAS ONE OF THE BUSIEST AND MOST PICTURESQUE PUBLIC MARKETS IN THE WORLD

Here the public buys direct from the producer. Many of the farm wagons are ingeniously built—almost as handy as a modern soda-water fountain. There are tanks for milk, shelves for jars and tins, and closets for this, that, and the other thing in the vehicles. The Danish farmers are among the best truck gardeners in the world. They have narrowly restricted acreage and they make every square foot of farm land produce all it can.

Photograph from W. W. Rock

IN THE COPENHAGEN FISH MARKET

Not far from where these women are offering the previous day's catch for sale is a restaurant, famous throughout Europe. Here the customer chooses from large tanks the fish that he wants baked or broiled.

performances. Nothing can be more lovely or stimulating dramatically than the performance of national plays, or of Shakespeare's *Midsummer Night's Dream,* in the woods of Klampenborg.

If the Danish weather could be counted on, these plays would become an institution to which tourists would flock in large numbers; but, though the Danish spring and summer are delightful when the weather is good, both in spring and summer some days do come when rain falls or the air turns damp and chill.

CASTLE OF KRONBORG REDOLENT OF SHAKESPEARE'S "HAMLET"

One of the most interesting performances was the playing of *Hamlet* on the ramparts and in the courtyard of the Castle of Kronborg. It gave one a thrill to see the background of the castle, unchanged since Shakespeare's time, static against the action of the drama. It is impossible to believe that Shakespeare had not the very aspect of the ramparts of Elsinore visualized in his mind when he made the opening scene of *Hamlet.*

An enterprising hotel keeper at Marianlyst, formerly a royal residence, has erected a monument over what he calls "the grave of Hamlet." Groups of school-girls may be seen occasionally dropping bouquets about the marble figure, and the legend runs that Sarah Bernhardt during her visit to Denmark actually shed a tear at this tomb. It is certain, however, that she drank a glass of champagne *à la mode* of Queen Gertrude to the manes of the Danish Prince!

It is a good piece of advertising, but the enterprising proprietor has rather overdone things by exploiting a pool near by as the pond in which Ophelia, in her madness, drowned herself.

In truth, the atmosphere around the Castle of Kronborg is very redolent of that one Prince of Denmark who is immortal. It makes no difference that he never lived at Kronborg, for his spirit haunts the place. There is the very lobby near the throne-room, and the long flights of stairs seem to be especially made for the flitting and wandering figure of Ophelia!

Photograph from Frederick Simpich

THE COPENHAGEN FISHMONGER DELIVERS HER GOODS FRESH AT YOUR KITCHEN DOOR

The famous Danish sole is peddled on the streets in small tanks.

Ann of Denmark, the Queen of James I, was, like all Danes, fond of pantomimic acting; and some students assert that the great scene within the scene in *Hamlet,* where King Claudius calls out in terror, "Lights! More lights!" was created in order to please the taste of this Danish princess for pantomime. There seems little doubt that *Hamlet* was written in her honor.

One may find the Padua of Shakespeare not exactly the real Padua, and certainly the coast of Bohemia never existed; but the longer one lives in Denmark the surer one becomes that Shakespeare must have been familiar with the country and its people, for even genius could hardly be so marvelously intuitive.

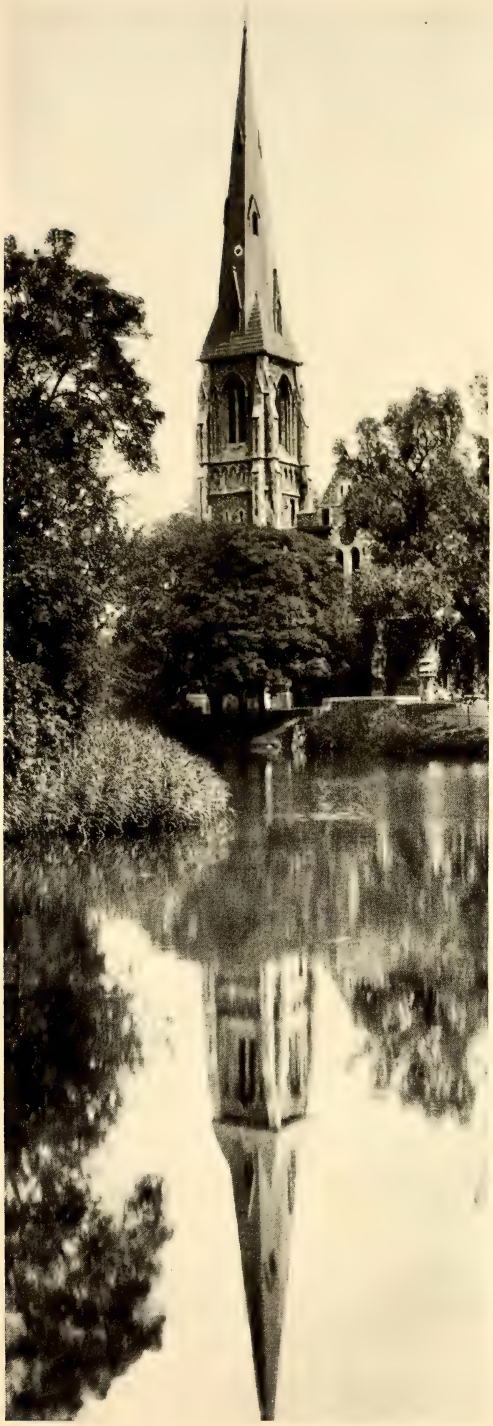
The Danish theater is part of the national life and it is taken very seriously. It sometimes shocks Protestants from other countries to find that it is the custom in many families to take the newly confirmed boys and girls to the royal opera to hear the typically Danish *Elverhoi* (The Elves' Hill) or Holger Drachmann's *Der War en Gang* (There Was a Time); and these performances are, as a rule, given on Sunday afternoon.

The Lutheran Church in Denmark is not at all antagonistic to the theater; and most of the pastors themselves, as a rule very well educated and cultivated men, would be shocked if anybody assumed to censure the induction of the young Christian soldier into the delights of the national playhouse.

It seems a pity that the pleasant fantasia, *Der War en Gang,* has never been played on our stage. The first scene, at a Dresden china court, is full of charm, humor, and delicacy. The theme itself might not be counted as altogether discreet for American children, but Danish fathers and mothers see no impropriety whatever in it; and, as in *Elverhoi,* there is some really entrancing music.

EVERY DANISH CHILD IS GIVEN A MUSICAL EDUCATION

The Danes have operas in their own language by Hartmann, Gade, and Heyse. They, with Lange-Müller, have created song music which gives melodies to every Danish home; and these melodies, set to poetic words by Danish lyric writers, are always in fashion. Jazz has been imported, of course. It is heard in the ho-



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THE ENGLISH CHURCH IN COPENHAGEN

This edifice, with its graceful Gothic spire, is situated in one of the most beautiful parks of the famous promenade called the "Long Line."

tels and in the cafés; but it is not taken seriously, and so solidly musical is the education of every Danish child—for it is the very exceptional child in Denmark who is not educated—that a spirit of real discrimination is seldom absent.

There is practically no illiteracy in Denmark, and to the establishment of the people's high schools, under the influence of Bishop Grundtvig, the spread of culture among the Danish people is largely due.

Before 1844 the Danish system of education was formal, dully classical, and intended only for the well-to-do. Grundtvig, a seer and a prophet, saw that the Danish people must not only be instructed, but cultivated, and that their national self-esteem could only be preserved if they knew the history of their own country and were made to be proud of it; that they must be insular and parochial if they were not taught to connect the history and progress of their own nation with the history and progress of other continental nations.

He knew that no country could exist by bread alone; but he knew, too, that no country could exist unless it discovered the art of providing bread for itself, and of softening the arduous work of gaining a living by something that was spiritual and stimulating.

In the first place, he believed that no man in Denmark was too poor or too lowly to grasp the glory of patriotism or to understand the difference between right and wrong.

SCHOOLS FOR THE PEOPLE FOUNDED BY A SHOEMAKER'S SON

The ideal of Grundtvig was different from the ideals of Luther; the God of Grundtvig was a shepherd rather than the keeper of a mighty fortress. Luther was not exactly a man of peace; he showed no desire to synthesize the traditions of the old church with the revolts of the new; nor was he particularly anxious that the peasants should be educated. Grundtvig broke away from the essentially Teutonic teachings of Luther in regard to the leveling education of the poor; but it is doubtful whether his policy of founding the high schools could have succeeded if it had not been for the force and character of Kristen Kold.

Photograph by Maurice P. Dunlap

FOUR FAIR DIANAS OF DENMARK

The Danish girl is fond of sport and often excels in riding, bicycling, swimming, tennis, and even boat-racing. A university "co-ed" has no trouble in keeping up with a crowd of fellow-students on a twenty-five-mile walk across country. Until her recent marriage to Prince René of Bourbon, Princess Margaret of Denmark, the only princess in Europe who has received a university degree, might be seen merrily bicycling or driving her little car on the roads between Copenhagen and her father's country house of Bernstorff.

Kristen Kold was a son of a shoemaker, and of a not very prosperous shoemaker. He early learned to detest the traditional system of education, and the directors of this formal system made a cabal against him, and he was forced to give up his intellectual ambitions and to be content with the avocation of book-binding. His book-binding, however, was very thorough, and he respected, as most Danes do, the art of the handicraftsman. He became, by accident, acquainted with the writings of Bishop Grundtvig, and, thus inspired, he took courage and founded at Rødding, in 1844, the first people's high school.

It was impossible that such a cultural school at that time could expect state aid. In the first place, it was not to be merely an academic or bookish school. It was intended for all who could listen and understand. Its whole power depended on the personality of the teacher. Its appeal must be solely through the spoken word. It was a courageous experiment, for its success would depend entirely on the support of the people. In a short time a hundred men, old and young, applied for admission.

But the women did not desire to be left out. Coeducation was looked on, not only in Denmark, but all through the Western World, as a horrible and dangerous innovation.

The pupils of Kristen Kold's first school were almost entirely farmers, and these farmers could not attend his lectures in the summer season, when they were needed in the work of the soil; but in the summer it was possible that some of the women might be free, and so he began by giving summer and spring courses for the women.

From this beginning grew the great system of Danish high schools, which it is said were the models on which our Chautauquas were founded; and also the system of university extension in Eng-

Photograph by Maurice P. Dunlap

VACATION TIME BY THE SEASHORE

The young people of Scandinavian countries have always mingled more freely than their brothers and sisters of southern Europe, and the famous Danish historian Saxo Grammaticus observed more than seven centuries ago, that "maidens admire in their wooers not so much good looks as deeds nobly done."

lish-speaking countries. But neither the Chautauquas nor the university extension courses have been as far-reaching in their effects as the Danish high schools.

NO REQUIREMENTS EXCEPT THE DESIRE TO LEARN

It is understood, of course, that these schools are not, like our high schools, introductions to college or the finishing off of the education of those who do not intend to go to college.

Unless some change has taken place in the system since I left Denmark, no requirement is necessary for the student except the desire to learn. There are no degrees given in these schools, no examinations, and no fixed standards of scholarship.

The teacher in Denmark has an acknowledged social position. It is understood that he must be freed as far as possible from material cares.

At the University of Copenhagen, for example, houses and pensions are provided for the professors; and teachers in the upper schools are so treated that they have a comfortable life, in a house and a garden, of which they have the tenure during their professional residence and a pension at a certain age.

PARENTS, THROUGH THE TEACHERS, CONTROL THE SCHOOLS

The duties of the government inspector of schools are very narrow in scope; he may report, but neither he nor the government can dictate to persons who consider themselves educational experts or to educated parents who know themselves just what their children ought to learn.

In Denmark, it is the parents, through the teachers, who control the school; but this does not in any way interfere with the high position which the teacher holds in a country where the education of a child to the utmost extent of his ability is looked on as an absolute necessity.

No newspaper in Denmark would dare to assume that an examination is necessary in these high schools for adults. The

high schools would be able to support themselves, even if they did not have certain grants from the communes.

It is understood that the teacher will say what he pleases in his lectures; and, as the students of mature years choose these schools themselves, they would look on it as a degradation if an arbitrary examination or standard were imposed on them.

The foundation of all these schools is religion and nationality. At Roskilde it was interesting to note that the modification of Lutheranism made by Grundtvig showed itself by a slight tinge of the monastic tradition of study and asceticism, for in these boarding schools high thinking is accompanied by plain living. Simplicity is not only the rule because it is economical, but because simplicity of life is one of the virtues most inculcated in the system of Grundtvig and Kold.

At Roskilde the school is set in a lovely plain, glowing with green in the spring and lightened by gleams of reflected light from placid waters. The room of each student bears on its door the name of one of the old monasteries, so famous in Danish history.

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A GUARD BEFORE THE DOOR OF THE ROYAL PALACE

The Danish King resided in the palaces at Amalienborg until recently, when he moved to the castle at Christiansborg, just restored after a disastrous fire.

HIGH-SCHOOL STUDENTS RANGE FROM 18 TO 30 YEARS OF AGE

The students in the people's high schools, men and women, are generally from eighteen to thirty years of age, and it is considered rather derogatory for a farmer's son or daughter not to have had the advantages of at least some courses in one of these schools.

As the interesting "Special Report of the Board of Education of Great Britain on Schools, Public and Private, in the North of Europe" says, "The primary aim of these schools is to inform, rather than to impart information."

That is, the teachers in the schools believe it their duty to increase the desire for information in the minds of the students; to broaden, to stimulate them, to divert them from the every-day drudgery of farm life, and to induce them, through an appeal to religion and nationality, to feel that their work is noble—in a phrase, to give the agricultural population a lively interest in all things of good

Photograph by Maurice P. Dunlap

A COUNTRY RAILROAD CROSSING WHICH SUGGESTS HOLLAND

The Danish landscape not infrequently resembles that other land where windmills, canals, wooden shoes, and tulip fields are also distinctive features.

repute, and to induce them to believe that a certain amount of happiness is within their grasp.

The ordinary educator in England and the United States would look with horror on the absence of discipline in these schools of the people; but, as all the students choose the schools themselves and are actuated by the desire to do team-work in order that there may be no distractions, outside discipline is as unnecessary as it is in the drawing-room.

DANISH STUDENTS HAVE LITTLE INTEREST IN INTERNATIONAL AFFAIRS

The men show, as a rule, little interest in the relations of nations to one another — that is, the political relations. This and the neglect of the serious study of finance and economic questions of universal importance are the only defects in the system of the high schools.

Since the World War, however, it is probable that the close connection of political with economic life outside of Denmark may be realized. But the lack of attention given to international economics and the belief that the rights of the worker must imply certain privileges, because his side of a contract is more "human," has much to do with the present financial crisis in Denmark. This is, however, being adjusted.

As to internal politics, the interest of the students is shown by the fact that more than 30 per cent of the members of parliament had been pupils in the high schools.

But it must be remembered that in Denmark politics is never looked on as something apart from the welfare of the people. The Dane knows exactly what he wants, and he will endure no merely personally ambitious leader.

If any politician attempts to interfere with a coöperative movement in the country, to deflect the thoughts of the people from the processes by which their country has been made prosperous, he is doomed at once to political extinction.

Team-work—you may call it coöperation if you will—is at the very heart of

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A FARM-HOUSE IN SCHLESWIG, RECENTLY RESTORED TO DENMARK

The scientific treatment of one of the worst soils for agricultural purposes in Europe, together with the coöperation of the farmers, has enabled the Danes to supply many foreign tables with food. On the island of Amager, where the descendants of Dutch truck farmers, brought over to Denmark at the dawn of the Reformation, raise the best cabbage and cauliflower in Europe, the greenhouses are so large that the soil in them is cultivated in the winter by plows drawn by two horses.

the success of the high schools. As the terms of the schools must be divided into two—November to March for the men, and the summer months for women and girls—each period is of five months' duration.

Some schools have only ten pupils; others four hundred. The attendance is made up of middle-class farmers and small holders of land, who may farm even as few as three or four acres.

The schools are not, as a rule, coeducational, though there are two or three exceptions. The school day is very long.

The state or the commune has nothing to do with the appointment of the teachers. They are chosen by the principal of the school, who, knowing that the success of the school depends entirely on its effect upon the students, can indulge in no favoritism. The teacher must have the power of stimulating and the gift of imparting information effectively.

Each hour is occupied, but it does not follow that every student is obliged to occupy himself in listening to lectures which do not interest him. He may, for instance, not find it necessary to consider the practical subjects. There are, for example, nearly fifty "folk-schools" which are purely cultural and do not offer courses in agriculture, cabinet-work, horticulture, or masonry. In 1914 the state contributed more than $160,000 for the support of these schools.

In the agricultural schools some preparation must be offered for entrance. These are generally attended by farmers with from fifteen to fifty acres, which, under the Danish system of intensive cultivation and accurate rotation of crops, is considered rather "substantial." The small holders, who have from three to ten acres of land—the Danish tun is more than equivalent to the English acre—and who add to their livelihood by laboring on other holdings, have schools of their

Photograph from Ewing Galloway

MODERN DANISH FARMERS AND FARM GIRLS IN THE OLD NATIONAL COSTUMES AND WITH OLD-FASHIONED FARM IMPLEMENTS

In the unexcelled Danish folk-school these men learn practical farming methods and the women are taught things that every farmer's wife and daughter should know (see text, page 149).

own, in which their practical problems are considered.

PRACTICAL TRAINING FOR FARM WOMEN

One of the most interesting of all the types of "folk-school" is that for girls and women who are the wives and daughters or who expect to be the wives of small farmers. Only a visit to one of these can make it understood how thoroughly the work is done. Without parade or ostentation, each girl learns the secret of leading the simple life cheerfully. She is taught not to waste anything and, above all, to take a pride in not wasting anything.

With the higher classes, it is understood that no girl should marry until she has been systematically taught how to keep a house and a garden practically.

In society, if one would miss at the dinners or balls a young baroness or countess or the daughter of a rich merchant or banker and inquire where the young lady has been during the season, the answer often was, "She is betrothed; she will be married in three months, and she has gone into the country to a *prestergaard*, to learn housekeeping."

This meant that she had been sent into the quiet house of a country clergyman in order that no detail of domestic management should be alien to her. She must learn how to graft rose-bushes and apple-trees; she must know exactly how to make conserves without danger of spoiling the precious product of the soil, for the Danes are taught to respect the soil as the mother of life.

In the schools for the daughters of the small land-owners a cheerful spirit of helpfulness is inculcated. Hurry and worry are entirely excluded; the art of making haste slowly is very much in favor.

It is possible for an elderly woman who helps to support herself and her family by selling eggs to solve the problem of why her hens do not lay more freely by attending a course, say, of two weeks. Her expenses and board are paid by the commune, which wisely holds that the prosperity she acquires is a valuable asset to the community, and she goes back home with an answer to her question.

And the answer has not been merely academic. She has seen model hen-houses and learned by observation.

When she returns home her husband, who may have had some trouble as to the yield of his three or four acres, takes her place. Thus, variety of life corrects the monotony of farming, and nothing in the management of the little place is left to chance.

In Mr. Foght's "The Danish Folk High Schools," Dr. P. P. Claxton says in the preface:

"In the thirty years from 1881 to 1912 the value of the exports of (Denmark's) standard agricultural products — bacon, eggs, and butter—increased from $12,000,000 to $125,000,000. Waste and worn-out lands have been reclaimed and renewed. Coöperation in production and marketing has become more common than in any other country. Landlordism and farm tenancy have almost disappeared. Rural social life has become intelligent, organic, and attractive. A high type of idealism has been fostered among the masses of the people. A real democracy has been established. This is the outgrowth of an educational system universal, practical, and democratic."

STUDENT LIFE IN A TYPICAL SCHOOL FOR THE PEOPLE

The special "Report of the Board of Education of Great Britain" of one of the largest schools in Denmark, that of Vallekilde (in northern Zealand), describes better than any words of mine what occurs in a typical school for the people.

This British report and that other British report made by Mr. T. P. Gill and Sir Horace Plunkett are the best foundations one can have for the agricultural system of Denmark as seen by keen observers. Speaking of Vallekilde, the special report says:

"The main object of this school is not to impart to our pupils a mass of useful information—that is only a secondary aim. The principal aim is to impart to them a spiritual view of life, so that they may see there is some sense in their existence and some connection in all that happens, in little as in great events. They will thus be prepared to enter on the work of life with good hope and faith, the faith that there is a direction from above in all that happens.

"The students are of all ages over eighteen years, most of them being twenty and twenty-five, and come from all parts

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A DANISH LANDSCAPE

There is scarcely a hill worthy of the name in all Denmark, but the well-kept farms, the fine herds of cattle, and the numerous waterways make the countryside very pleasing to the eye.

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A VILLAGE HOME WITH THATCHED ROOF IN SCHLESWIG

These are some of the people who are keeping pace with the world's increasing appetite for Danish butter and eggs.

Photograph from Emil Opffer

A STREET IN RIBE, CITY OF MANY MEMORIES

Once this was the most important city in Jutland. Near by is the many-gabled old castle, Riberhus, once the favorite residence of Danish kings. A series of misfortunes eventually befell Ribe and the Reformation proved its death-blow. To-day, in inconspicuous quaintness, it stands guard over its memories.

of the country and all classes of society, though the majority belong to the class of small freeholders and cottars, which is so numerous in our country.

"Now I should like to give you the picture of a single day here in the winter months, when we have from 190 to 200 young men under our care from the beginning of November to the end of March.

"The bell rings them up at 7 o'clock in the morning. They then dress, make their beds, sweep out their rooms, wash, and at 7:30 are ready for a cup of coffee and a bun.

"At a quarter to 8 the principal has morning prayers with his household; there also are to be found most of the students, though attendance is not compulsory. First a hymn is sung, then are repeated baptismal vows, the Apostles' Creed, and the Lord's Prayer. Another short hymn brings the service to a close.

GEOGRAPHY IS EMPHASIZED

"At 8 o'clock, four mornings in the week, I give a lecture on geography, and thereby I try to show the audience what relation there is between man and the earth, and how the people in the various countries have succeeded in reducing the soil to subjection. A song suited to the theme is sung both before and after the lectures. On the two other mornings our Free Kirk clergyman lectures on church history.

"Breakfast comes at 9:15 and consists of a couple of sandwiches and a glass of home-brewed ale.

"At half-past 9 the artisans go to a special department in a house a few minutes' walk from here, where they are taught what belongs to their various trades—carpenters in one room, bricklayers in another, painters in a third, and so on. Most of their time there is taken up in learning to execute working drawings. Likewise the fishermen go to their special department, where they are taught navigation and the natural history of fishes and other water animals, sea-plants, etc.

"The farm lads stay here in the central building and are divided into four classes, held in various rooms, and for two hours practice writing and drawing. From 12 to 1 the principal gives a lecture on the history of Denmark, the political history as well as the history of civilization, dwelling more especially on the lives of noted men and women of the last century, whose work we are continuing.

"At half-past 1 comes dinner in the large room below.

"At half-past 2 the artisans and the fishermen go to their own departments again until 6 o'clock. The farm-lads in the meantime are taught accounts and arithmetic for an hour in two classes.

"At half-past 3 these last have gymnastics according to Ling's system.

"At 5 various teachers lecture to the farm lads only, on physics, on the geography of Denmark, on hygiene, and the history of the world.

"At 6 supper is taken.

"From 7:30 to 8:30, lectures for the whole school are given on the history of Danish literature by Mr. Hansen, and on various subjects by the other teachers, Mrs. Hansen twice a week reading aloud from the best of our poets, and I once a week showing lantern slides or glass photographs from all parts of the world and explaining them to the pupils.

"From 8:30 to 9:30 the artisans and fishermen have their gymnastics, while the others have leisure time for the rest of the evening. But you will understand there is not much leisure time for any of them; what there is, is used for writing letters, reading, conversing, playing, or short walks.

"At 10:30 the electric light is put out in the school-rooms."

TEACHERS WELL PROVIDED FOR

No teacher in the rural parts of Denmark "boards around." Married male teachers have seven or eight rooms placed at their disposal, always including a garden, very near to the school-house. The garden is indispensable. Each teacher manages to grow his own vegetables and fruit, and all Danes grow roses in the season.

Unmarried women teachers are provided with two or three rooms, and each teacher has a separate entrance to the house in which she lives.

When a teacher has served in the schools for twenty years he or she is entitled to a pension, which until recently had the purchasing power of from $1,200 to $1,900 in Denmark. The amount of the pension depends on the length of

Photograph from Emil Opffer

FREDERIKSBORG CASTLE

The gables, pinnacles, spires, turrets, and chimneys of this historic pile, occupying three small islands in a lake near Hillerod, north of Copenhagen, are particularly pleasing. Two of the round towers were built by Frederick II in 1562, but most of the building was erected by Christian IV in 1602. In the foreground is the Neptune Fountain, a copy of the original carried off by the Swedes in 1659.

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OLD PONTOON BRIDGE CONNECTING SONDERBORG, ON THE ISLAND OF ALSEN, WITH THE MAINLAND

This town in Schleswig is hemmed about by four hills. Its deep harbor has a double outlet.

Photograph from Emil Opffer

WHERE HAMLET PHILOSOPHIZED AND PROCRASTINATED: KRONBORG CASTLE

This is Shakespeare's castle of Elsinore. The legend is that the ghost did not appear on the rampart, but on the outside of one of the towers.

service, and sick or disabled teachers are looked after in a pecuniary way.

Tuberculosis is one of the scourges of Denmark. Teachers who have been afflicted with the "white plague" during their service receive a pension of two-thirds of their salary.

It is rather interesting at this moment, when a serious agitation in this country is beginning for the betterment of the teaching class, to note that the Danish Government provides for the meeting of a growing cost of living by a rule automatically increasing the salaries of the teachers to meet their expenses adequately.

The tendency of legislation in Denmark is to abrogate landlordism without destroying the legitimate rights of property, as the tendency of the coöperative movement was to destroy the inefficient and profiteering middleman.

During the war the decrease of Danish emigration to the United States gave the government a pretext to provide more land available for farming. The new election law, which included suffrage for women, increased the number of voters and likewise the number of those who had the right to own land.

Under the new law, no money was required in order to acquire a piece of land; good character, a certain certificate of energy, and the right to vote were all the qualities necessary. The would-be landowner was obliged to pay interest at 4 per cent on the fixed value of the land.

It must be remembered that in Denmark a farm is not valued by the number of acres it contains, but according to the stock, the implements, and the condition of the soil.

The energy and knowledge of the previous owner are assets to him in disposing of his land.

THE DANISH FARMER THE FREEST IN THE WORLD

The evolution of the laborer on the soil can be easily traced in Denmark through the growth of the democratic spirit, which gradually destroyed serfdom, to the present time, when the Danish farmer is perhaps the freest in the world.

The constitution of 1848 liberated Denmark from a condition of dependence largely brought about by the gradual transference of all power to the king or to the aristocratic landowner, and the destruction of the ideals of the Middle Ages in Denmark.

It is a curious fact that in Denmark today, where the great landowner is not an absentee and has no tradition of absenteeism behind him, the common people have an almost bitter antagonism toward the aristocratic caste. And this is all the more strange, since the great landowners in Denmark till their soil and make it productive.

The complaint that the English agriculturist makes, that thousands of acres of land are mere unproductive pleasure grounds for "the dukes"—not so long ago the objects of Lloyd George's antagonism in England—would be groundless in Denmark.

THE LANDOWNING ARISTOCRACY MAY DISAPPEAR

Just at this time it looks as if the Danish landed estates would be cut up into comparatively small holdings. The abolition of the majorats, which practically means the disappearance of the law of primogeniture and of the law of entail, would mean the disappearance of a landowning aristocracy.

There is an aristocracy in Denmark, an aristocracy of a very high class, as a rule, but it has lost its privileges. Its titles have even less value socially than they have in France, which is a republic, and, under the usage which makes all the sons and daughters of a count or a baron counts and countesses or barons and baronesses, titles soon lose their distinction, and new titles of nobility are no longer given.

The aristocracy, which for a long time controlled the Upper House, fought hard against the subdivision of the land, and its members were not sympathetic with the Danish system of credit banks, by which any man of good character, with a very small sum of ready money, might be able to own a farm.

The would-be farmer must be over twenty-five and under fifty years of age and he must have worked in agriculture for four years. Two reputable citizens are required to sign a guarantee as to his standing in the community and his reputation for honesty. He then offers to pay one-tenth of the cost of the land and a certain sum in addition as a surety that

Photograph from Gilbert Grosvenor

A DIP IN THE BALTIC AT BORNHOLM

The main mass of this island is granite, worn smooth by the great Scandinavian glaciers. Its rock-crystals have made it renowned. The inhabitants manufacture porcelain and terra-cotta and fish in the surrounding waters. Only recently has so-called promiscuous bathing (men and women on the same beach) become customary at the Danish seaside resorts.

his farming may not be an utter failure. These conditions being fulfilled, nine-tenths of the cost of the farm, which includes live stock, etc., is furnished by the state.

The Mortgage Bank of Denmark is behind him and the conditions do not impose on him too great a burden. In 1850 the total number of small farms was 180,090. In 1905 there were over 289,000. During that period the number of men who rented farms declined from 42.5 per cent to 10.1 per cent.

Mr. Harald Faber, in his report, tells us that of the total population engaged in agriculture in 1911, 535,758 were employers and their dependents and 399,534 were employees or their dependents.

It is argued against this system that many men buy small farms on credit, make improvements beyond their means, and go too much in debt. There are cases

Photograph from Emil Opffer

AN OLD CHATEAU AT NYBORG, ON THE ISLAND OF FÜNEN

Odense, the capital of the island, was the home of Hans Christian Andersen, and the house in which he was born is now filled with memorials of this famous creator of fairy lands and people.

of this lack of prudence, it is true; but, as a rule, the system seems to have worked well, and if it continues to do as well, the majority of the agricultural Danes—the vast majority—will soon be masters of their own soil.

IN DENMARK NEARLY EVERY MAN WORKS HIS OWN FARM

The habit of farming land on shares, which we find in some of the Southern States, where an enterprising colored man often becomes the arbiter of the white owner's destiny, does not obtain in Denmark. Every man works his own farm.

In the summer months, however, over 20,000 Galicians and other immigrants come into Denmark to dig the beet root and to do other jobs which the Danish farmer prefers not to do. The large-estate owners are obliged every year to provide facilities for these alien laborers, who go home in the autumn quite content with the result of their work.

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"LITTLE MOTHERS" AND THEIR SISTERS IN SCHLESWIG

By the Treaty of Versailles the homeland of these little folk was returned to Denmark after having been ruled by Prussia since its seizure by that country in 1864.

Denmark is not an industrial country in the sense that it is a country of manufacture. The scientific treatment of one of the worst soils for agricultural purposes in Europe, joined with the equally scientific system of coöperation, enabled it to monopolize the export of butter, bacon, and eggs into England and Germany. Before the war the Danes supplied the breakfast table of the British, and the export of milk and cream, and even of beef and hogs, into Germany taxed their capacity.

DANISH BUTTER HAS A WORLD-WIDE REPUTATION

Danish butter has the deserved reputation of being the best in the world. It is standardized, and the government itself would be held responsible for any falling off in the guaranteed quality of this product. It is not inexpensive, most of it is exported, and it seems rather paradoxical that in this country of butter the majority of the people eat a very high-grade margarine.

Every Danish egg is dated; but although the Danish fowls are prolific and the eggs are carefully looked after, yet the Danish egg does not enjoy the deservedly great reputation of the butter and the bacon.

In spite of the old-age pension, of the grants to widows, of the unemployment insurance, of the upkeeping of admirable hospitals for the poor, the industrial classes in Copenhagen indulge frequently in strikes.

Of late the American-Scandinavian Line has been put at a great disadvantage because of the recurrence of these strikes. One result of them was much deplored in Denmark. During the shortage of butter in the United States, cargoes to supply this shortage were sent to America; but the strikers delayed their transit, and the butter, when it arrived here, was not equal in quality to the standard prescribed in Denmark. Complaints were made from this side, and a committee of the great Danish butter exporters in Denmark came over here to make their explanations and to show our people what Danish butter at its best really is.

Employers of labor in Denmark are not without fixed responsibility. For example, when I was Minister Plenipotentiary at Copenhagen I followed a rule obligatory on everybody except diplomatists: I kept a bed in a hospital for my people, contributed to their insurance, and altogether followed the laws which prevent an employer from dropping a servant penniless whenever the caprice seizes him. In the country an employer must give his servants a notice of six months; in the city, a month is sufficient.

I recall the fact that one of my footmen, having been sent to a hospital for two weeks, complained that "they gave him everything except wine, and that he was expected to pay for!"

One of the best-known captains of industry in Denmark is Admiral de Richelieu. He was instrumental in encouraging the introduction of the Diesel motor, and some of the earliest and most effective experiments in the application of the Diesel motor to navigation were made in Denmark by the East Asiatic Company, of which he is a director.

PATRIARCHAL TRADITIONS MAINTAINED IN COUNTRY HOMES

The cultivated Dane has very esthetic tastes, and it seems a pity that the life of the country houses of the Danish aristocracy should disappear when their lands are divided. A typical Danish castle is that of the Count and Countess Raben-Levitzau. In country houses like theirs the old Danish traditions—rather patriarchal—are still kept up.

At Christmas, for example, when the Christmas tree is lighted on the sacred eve, the master and mistress of the house join hands with the servants and sing the old Danish hymns around the blazing pine or fir.

Nobody that has not lived in Denmark and known the charm of its family life can appreciate what the term *hyggelig* means. It is something even better than the German word *gemuthlich* or the English word "cozy."

At present, owing to the proximity of a struggling Germany, to the unrest in Russia, to the financial difficulties in England, and its own necessity for readjustment, Denmark is not as prosperous as usual.

At the same time, it has great resiliency. Wealth is rather equally distributed; the great fortunes gained during

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A QUARTET OF SWEDISH VISITORS IN COPENHAGEN

These peasants are wearing the picturesque costumes of the Mora, Leksand, and Rättvik region around Lake Siljan, one of the most fertile and attractive districts in Sweden.

the war by a small circle of profiteers have disappeared. The Danes took measures early to prevent the dumping of cheap German goods into their country, and, at least, they have gained one advantage from the war—an advantage not so great as it ought to have been, however—the return of a part of Schleswig, stolen by Prussia in 1864, to the mother country.

THE UNITED STATES CAN LEARN MUCH FROM DENMARK'S SOCIAL REFORMS

Denmark is intensely interesting to the student of social reforms, because it has put most of them in practice. Even the most liberal of its Liberals is constructive. There is no anarchy in Denmark and little chance for the progress—much less than in Sweden—of the Bolsheviki.

The United States might learn much from the example of this little country as to the care of that Danish machine for giving milk—the cow. As to the abrogation of those grafters who deprive the farmer and the ultimate consumer of their just rights, we have many lessons to learn.

But some of the enthusiastic advocates for our imitating the Danish methods go too far. A country formed of forty-eight different States, each with its own peculiar problems, cannot be guided in the same way as a small country which is almost purely agricultural and where the industries concern themselves largely with export facilities.

Denmark, it must be remembered, exists practically for the production of certain necessaries of life, and therefore all its laws are made for the protection of the farmer, but not for the monopolization by the farmer of rights that belong to other people.

The farmer in Denmark is never a speculator. It is impossible that a "corner" should be made in any of his productions. These truths might well be considered by our farmers themselves in rural communities and not left to the vagaries of professional legislators.

In the art of painting and sculpture, in literature, in science, Denmark has no mean place. It is true that all her sculptors have not the reputation of the famous Thorvaldsen. There, for instance, are Jericheau, Bonnesen, Kai Nielsen, and Einar Jonsson. Cellini has no rivals in Denmark; but A. Michelsen, the court goldsmith, has executed some very exquisite gold and silver vessels and ornaments designed by the disciples of Cellini.

A Danish lady, as a rule, does not care to wear a piece of jewelry unless it is especially made for her. In our country, at a great ball or a banquet, one will see a score or two of "sunbursts," or bracelets, or pendants almost all alike. No matter how simple the buckle, or the bracelet, or the necklace of a cultured Danish woman may be, she will not have it resemble the ornaments worn by another person.

This spirit assists very greatly in the production of artistic handicraft.

NOTABLE FIGURES IN THE WORLD OF LITERATURE

Of all the Danish authors, Georg Brandes has the greatest international reputation. Next to him comes Harald Høffding. Georg Brandes has a remarkably synthetic mind. He is the first and most important of Danish internationalists in the literary sense; but his hedonistic philosophy has had a deplorable effect on the Danish intellect, an effect which has been combated by the constructive philosophy of Harald Høffding.

Johannes Jörgensen is, as to form, the most exquisite poet in Denmark, and his *Clock of Roland,* a cry of despair and triumph for Belgium, is one of the most justly celebrated of all the books inspired by the late war.

Johannes V. Jensen is a novelist who deserves his great literary reputation. Pantoppidan and Martin Nexø have a large following.

Of the painters, Kröyer is the most lucid, the most luminous, and probably the one who will be in the future better known and long remembered. Laurits Tuxen is best known in England as a modern historical painter. Julius Povlsen deserves a high place; and Zahrtmann, whose coloring is strangely misty and individual, deserves to be well known in our country. Zahrtmann's pictures flame with color, seen through a mauve haze.

The most charming painters of delicate interiors are Hammershöi and Helsö; Skovgaard is an intensely religious painter, with much of the quality of Fra

Angelico in his work, and next to Joachim Skovgaard, in this *genre*, is his brother Niels. The newest school of artists is always in advance of last year's eccentricities. It tries "to go one better" than Paris!

One of the most beautiful buildings in Europe is the new Town Hall of Copenhagen, created by Martin Nyrop. It is a worthy companion of that admirable edifice, the Bourse, which dates from the reign of Christian IV (see page 121).

DANISH ART IS NEVER COMMERCIALIZED

The saving quality in Danish art is that not even its minor productions are commercialized. The royal Copenhagen pottery, which would be popular in the United States if our absurd tariff did not make its cost almost prohibitive, is an example of this. It developed from the imitation of the Dresden china by the makers of porcelain in Denmark, under the patronage of Queen Juliana Maria in the eighteenth century. It is unique, and as beautiful and as true to nature as it is unique.

The best thing that I, as an amateur, can say of Danish art, is that it is individual, national, and, like Danish humanism and science, is never followed simply with a view of gaining money.

If I seem too enthusiastic as to the spirit and the material of this little country, it is because I have lived there; I am not blind to its defects. I regret the decline of the sturdy religious spirit of the older days and of an increase in the laxity of sex relations, which results from the decay of Christianity and the growing tendency, not confined to Denmark, of the new paganism.

However, if the Danes love Denmark, it is because their country and its institutions are worthy of love.

PRESENT TREND OF THE GOVERNMENT IS TOWARD PATERNALISM

It is only fair to add that the burden of taxation on the well-to-do in Denmark is almost intolerable at present. The legislation in favor of the laboring man has in some instances resulted, as paternalism in government generally results, in making him feel that the state owes him a living, whether he works or not.

The late financial crisis in Denmark was made more alarming by the lockout of the employers in February. Strikes followed, and during the winter over a hundred thousand men were thrown out of employment. The farmers suffered, not only from the usual coldness of the season—ice stopped navigation at Copenhagen and Esbjerg—but from the determination of the dock laborers at the seaports to impede exports until their demands were complied with. In consequence the banks have suffered. The farmers took the matter in hand and did the work of shipping their own exports.

Economic readjustments have begun. The lesson taught by the vagaries of the radical government will have the effect of teaching the Danish folk that consideration must not be shown for the workingman only. If capital is taxed above its earning capacity for his apparent benefit, it ceases, to his detriment, to function normally. But the Danes are quick at learning by experiments.

Notice of change of address of your GEOGRAPHIC MAGAZINE *should be received in the office of the National Geographic Society by the first of the month to affect the following month's issue. For instance, if you desire the address changed for your October number, the Society should be notified of your new address not later than September first.*

THE FIGHT AT THE TIMBER-LINE

By John Oliver La Gorce

Author of "Warfare on Our Eastern Coast," "A Battle Ground of Nature," "Roumania and Its Rubicon," "Devil-Fishing in the Gulf Stream," "Pennsylvania, the Industrial Titan of America," etc., in the National Geographic Magazine

AMONG all the stirring struggles that the forces of Nature stage in their wars over disputed territory and their strivings for supremacy, there is none more intense or unrelenting than that at the timber-line, where the advance guard of the Legions of the Forest engages in mortal combat the entrenched troops of King Frost.

One would have to wander far afield indeed to witness more brilliant tactics or to meet with such masterful strategy as the tree armies employ.

A far-flung line is this forest frontier, and it has more separate fields of conflict than there were when the world's effort to break Central Europe's stranglehold upon civilization was at its height.

There are three principal battle areas where the forces of King Frost are entrenched against the trees—the Arctic citadel, the Western America line, and the Himalaya-Alps front. Isolated campaigns rage on lone peaks and on short and sequestered mountain ranges.

On the Arctic front the contending forces are drawn up in battle array at sea-level.

In the Western America theater, the war zone climbs higher and higher, until, at the Equator, the pitiless strife is waged in the rarefied atmosphere of twelve thousand feet or more. Then it sweeps down again until it reaches sea-level at the Strait of Magellan end of the Andes.

In the hostile area that stretches along the Himalayas and the Alps from western China to eastern France, there are numerous quiet sectors, but a strategically continuous front.

TREE SOLDIERS ENDURE THE GRIND OF AN UNCEASING CAMPAIGN

Hardy as trained-to-the-minute men are the tree soldiers that can stand the awful grind of the unceasing campaign. The training camps are scattered all over the salubrious country of the back areas, and only picked troops of tested courage ever reach the firing-line.

Tropical trees are too soft of fiber for aught but home-guard duty and last-ditch-reserve support. After a few hundred miles poleward or twice as many feet skyward they gradually drop out, and hardier and better trained substitutes fill their places, until, at last, the troops that started are, without exception, left behind, and fresh ones everywhere reform the serried ranks.

Where the last palm that typifies the tropical soldiery drops out, a third type begins to fall in line, and by the time the broad-leaved troopers begin to grow jaded, the keen, needle-leaved legions from the pine woods are ready to fill the place of the stragglers, in order that the ranks may be kept full.

629 DIVISIONS CALLED TO THE COLORS

How heart-breaking and stamina-testing the long march proves to be is strikingly shown by the record of the 629 divisions that have been called to the colors between sea-level on the Florida coast and timber-line in the Colorado mountains—including the palm and the palmetto divisions, the oak and the hickory, the maple and the birch, and other crack outfits.

Gradually the divisions are reduced, by desertions and straggling, to brigades, regiments, battalions, companies, and squads, and at length formations disappear; so that when, finally, the battle field itself is reached, all but a beggarly score are missing, and even these survivors of hardy divisions, the regulars of the tree armies, have been decimated.

And yet, when the battle front is reached, the Titanic struggle is still to open. No operations in mass formation are possible there. The pine divisions have advanced in great, dark columns, now seeking protection from the bombing expeditions of the air service, now accepting the support of the shock troops of the birch divisions, and again bearing the brunt of the enemy's artillery fire of hail and sleet.

Photograph by A. J. Baker

CAUGHT ON THE WIRE

King Frost marshals his forces in Glacier National Park and casts his pall of snow over the scouts sent forward to dig in.

The front-line trenches are thinly held by those who make up in courage and bulldog tenacity of purpose what they may lack in numbers.

Let us brave the dangers of the firing line to get a look along these trenches.

As one's eyes sweep the situation on any narrow sector, the tragedy of the struggle stands out in bold relief. Here a small, knotty and gnarled tree occupies an unprotected listening post; there a small squad holds a shell crater where it would seem that no living thing could exist.

NO SUCH THING AS RETREAT

However furious the conflict, there is no such thing as retreat. Every tree soldier stands rooted to the terrain it has taken, dying if need be, but never falling back. The thousands of mangled and maimed who fight on so long as a single spark of life remains, show what courage the tree troops possess.

The barrage of the wind may pitilessly beat upon them, the machine-gun fire of the sand blast may transform them into animated totem poles, but not until the hand of death itself is laid upon them will the trees surrender. Everywhere the whitened corpses of the unburied dead are to be seen, and their bones, denied the privilege of sepulture, will remain until the desiccating power of the powder-dry atmosphere causes them to crumble—mute witnesses of tragic bravery.

Watch the living as they fight, some with their stormward sides as bare of branches as a hewn log, and on their leeward sides only enough limbs to convert them into weather vanes; others with their very heads bowed to the ground. Even the whitebark pine, representative of that great host of sky-seeking trees which rear their proud heads above the remainder of the forest, on the principle that they must aspire or die, creeps along the ground, like moss, with never a hint

Photograph by S. H. Willard

THE SKIRMISH LINE NEAR INDIO, CALIFORNIA, WHERE THE BATTLE IS WAGED AGAINST DROUGHT RATHER THAN WIND AND SNOW

No spring supplies these lonely palms of the desert with water.

of the proud carriage and high head that characterized it when on dress parade in the regions behind the war zone.

As one stands at timber-line, there comes to mind that splendid eulogy of those "children of the rock, gray moss, dark shrub, the meager chamois flock," whose natures have been tempered and trained until they are able to stand "exemplars of creation's plan that all shall fight for life, and those shall live who can."

A TINY VETERAN OF 255 YEARS OF BATTLE

The hardships endured by the tree soldiers can be appreciated only by those who have observed the battle at close range. John Muir tells of finding a pine warrior whose trunk was only four inches in diameter and whose topmost tassel reached a bare three feet from the ground; yet when he counted the rings that constituted its service stripes, he found it to be a veteran of 255 years of duty on the firing line.

It is fascinating to study the strategy and tactics of the forces of King Frost and to examine their methods of warfare. They have long since discovered that the masks the trees have adopted are effective against the gas of sheer coldness, the most frigid known spots on the earth's surface being held by trees. But if the trees can stand all attacks of cold, they suffer excessive casualties at the hands of the winds.

The timber-line is no shortest-distance-between-two-points affair. The fortunes of the battle and the terrain both tend to make it as irregular and as sinuous as was ever the battle line that stretched from Switzerland to the sea during the World War.

The power of the trees to adapt themselves to their environment is amazing. In the tropics and the temperate zones, vegetation is killed by freezing, as any one walking through a vegetable garden after Jack Frost has made a raid on a cold autumn night can tell from the blackened leaves. But in timber-line districts it is not the sudden frost that injures vegeta-

tion. Plant life there can stand freezing without difficulty. It is rather the thawing process that hurts in such regions.

The wonderful adaptability of plant life to its environment is to be seen on the tundra of Russian Lapland. There the thermometer crosses the freezing point several times a day, but the leaves on the stunted growth that occurs in spots do not seem to suffer. So, too, in the Alps some species of gentian and ranunculus, even when in full blossom, spend their nights frozen stiff and their days as bright and chipper as if they had never known a chill moment.

These flowers have adjusted themselves as thoroughly to the cold at timber-line as the cactus has to the heat in the tropical desert. And the trees are led by these "little children" of the timber-line in adjusting themselves to the inhospitality of their environment.

The character of the warfare on the sea-level polar timber-line differs from that on tropical mountain heights. On the former there is a homogeneity of forces not encountered in the latter.

Everywhere on the polar timber-line the trees without exception become stunted and dwarfed, degenerating into gnarled growths that little resemble their stately brethren of milder regions. Neither the broad-leaved nor the needle-leaved species, as a rule, attains a height of more than three feet.

THE MARCH OF THE TREE HOSTS UP A MOUNTAIN SIDE

The mountain timber-line, however, has highest interest for most people, since it is in a theater of war accessible to any hardy mountain-climber, who, as a military observer, may wish to watch the great battle.

A hundred romances are concentrated in the story of the march of the trees up the mountain side toward the battle front. Far down on the plain out of which rises a tropical mountain like Orizaba, in Mexico, there is luxuriant vegetation. If the rainfall is plentiful, it grows abundant on the lower slopes. Palms and bananas are the characteristic trees of the first two thousand feet.

However, when that elevation is reached these have largely given place to the tree-ferns and figs, which, with allied species, now take up the climb, and "carry on" until they come to the 4,000-foot level. Here they, in turn, begin to drop out, their places being filled by laurels, myrtles, and related species.

These drive on another 2,000 feet, giving way, in their turn, to the broad-leaved evergreens, which take up the climb at about 6,000 feet and march on until they reach 8,000 feet. Gradually they fall by the wayside and their ranks are filled by the summer-green broad-leaved tree.

At 10,000 feet the conifers fill up the gaps and finally arrive at the trenches.

In many mountains there are variations in the vertical distances to which the different trees climb, and in some cases one or another of the list of reservists is almost entirely missing. It is a singular fact that the various types of trees are able to climb higher on mountain ranges than on isolated peaks, and that, as a rule, the timber-line is higher on long ranges than on short ones, as if confidence and courage were imparted by a dense formation of fellow-fighters.

THE WAR CORRESPONDENTS OF THE TIMBER-LINE BATTLE FRONT

The great contest at timber-line, as in human warfare, has called forth a large number of war correspondents. One of the ablest of these was John Muir, whose love of Nature is an inspiration for every one who reads his books. And the best-loved part of Nature to him was that wonderful country, the Sierra region of the Pacific Coast.

Like the true war observer, he wrote with equal charm of the larger strategy of a big drive and of the brave deeds of a single warrior. For him the whitebark pine had a particular interest, not less from the methods of its fighting than for the unwonted heights to which it bravely climbs.

In the Yosemite mountain forests he found it always in the front-line trenches. Where he first encountered it on the march up the mountain it was an upstanding tree trooper, some forty feet high; but as he followed its footsteps up to the regions where, on the rocky, wind-swept slopes, the snow lay deep and heavy for half the year, it grew shaggy and squat,

Photograph from F. L. MacFarland

MOUNT EVANS, COLORADO, FROM WINDOW LEDGE

The proposed Mount Evans drive will connect the Denver Mountain Park System with this, one of the highest peaks in the United States, elevation 14,259 feet. The city of Denver has already built 10 miles of this drive to Window Ledge, on Squaw Mountain. The United States Forest Service has built an additional 10 miles to Echo Lake. Most of the remaining 20 miles of the drive will be above timber-line, reaching an elevation of 12,740 feet at Summit Lake, on Mount Evans.

Photograph by Vittorio Sella

THE "NO MAN'S LAND" OF THE TIMBER-LINE WARFARE

On the roof of the world, among the eternal snows of the Himalayas, even the most intrepid tree combatant dare not stand against the heavy artillery of avalanche and the ceaseless machine-gun fire of ice-storm.

Photograph by Vittorio Sella

THE BATTLE LINE NEAR THE CREST OF THE CAUCASUS

Remorselessly and irresistibly, the glaciers crush through the mountain passes, giving the trees little chance for a foothold, but even here, on the very shores of the ice rivers, the chasseurs of the forest stand their ground.

Photograph by Vittorio Sella

STORMING THE CAUCASUS HEIGHTS IN MASS FORMATION

Long ere the snow-line is attained, however, the trees will be riddled by enemy cold, and only a stalwart few will ever reach the front-line trenches.

Photograph by Vittorio Sella

WHERE MEDIEVAL METHODS OF WARFARE STILL OBTAIN: A SCALING PARTY OF FLOWERING APRICOT TREES HALTED BY A STREAM MOAT IN THE HIMALAYAS

Unable to cross the swift-flowing mountain torrent, the impotent forest troops sit down before the rock-ribbed walls of the fortress heights. But no timber-line battle was ever won by Fabian tactics.

Photograph by Photo-Craft Shop

"THE OLD GUARD DIES; IT NEVER SURRENDERS"

Making a final stand on the timber-line of Mount Baldy, Colorado, at an elevation of 11,500 feet. "The front-line trenches are thinly held, but those who man them make up in courage and bulldog tenacity of purpose what they may lack in numbers" (see text, page 166).

Photograph from L. A. Dollner

HUMAN ARMIES MAY GO INTO WINTER QUARTERS, BUT WAR RAGES FIERCEST FOR THE TREES WHEN BOREAS TAKES COMMAND OF THE COSSACKS OF SLEET AND SNOW

Relentlessly the elements launch their enveloping forces of frost against the forest soldiers; but, like Napoleon's drummer boy at Austerlitz, there's not a sapling among them that knows how to beat a retreat.

Photograph by Curtis and Miller

ON THE TIMBER BATTLE LINE: THE GOVERNMENT ROAD AT RICKSECKER POINT, NEAR PARADISE PARK, MOUNT RAINIER NATIONAL PARK

Photograph by Putnam and Valentine

NATURE UNFOLDS A MATCHLESS PANORAMA OF LAKE AND MOUNTAIN AS THE SETTING FOR THE BATTLE FIELD WHEREON THE TREES AND ELEMENTS WAGE THEIR TRUCELESS WAR

A view of Cascade Lake, Emerald Bay, and Lake Tahoe from the summit of Mount Tallac, California. "The roads by which the trees march to the timber-line usually follow the hollows that reach up to the heights."

Photograph by A. H. Barnes

ADVANCING IN OPEN FORMATION: AN EVENING SCENE IN MOUNT RAINIER NATIONAL PARK

Over the saddle is seen the summit of Mount Adams, 40 miles away.

Photograph by F. H. Kiser

WITHSTANDING THE ATTACK OF WINTER

Trees on the slopes of Crater Lake, Oregon. The summit of Mount Scott is seen above the clouds in the distance.

Photograph by Vittorio Sella

AN ADVANCE DETACHMENT OF TREES RECONNOITERS THE IMPREGNABLE SUMMIT OF SNOW-CLAD MOUNT SPEKE, IN THE RUWENZORI RANGE, EQUATORIAL AFRICA

Although the Ruwenzori Mountains lie almost on the Equator, their highest peaks rise above the limits of perpetual snow, and, strive as they may, the arboreal armies are turned back; for here, indeed, "They shall not pass!" (See also page 184.)

Photograph by Wiswall Bros.

CLIMBING TO AN EAGLE'S THRONE ON FLATTOP MOUNTAIN, OVERHANGING THE GREEN WATERS OF DREAM LAKE

It is around these rugged summits that the great black eagles of the Rocky Mountain National Park can be found. Two bold climbers are seen endeavoring by means of ropes to scale the cliffs and arrive at one of these eagle aeries.

Photograph from A. C. Lovekin

LIKE SIRE, LIKE SON: DESCENDANTS OF THE ABORIGINAL PALM TREES OF AMERICA HOLD THE TERRAIN WON IN CALIFORNIA BY THEIR FOREBEARS CENTURIES AGO

In Palm Canyon, Riverside County, California, grow the only aboriginal palm trees in the United States. A movement is on foot to set aside as a national monument the area in which these trees flourish.

Photograph by Vittorio Sella

A ROYAL BATTLE GROUND OF CENTURIES

From this Equatorial East African valley floor the trees surge upward, right and left.

Photograph by Vittorio Sella

THE BATTLE OF THE TREES ON THE RUWENZORI RANGE HAS BEEN OBSERVED BY SOME OF THE MOST FAMOUS FIGURES IN THE HISTORY OF AFRICAN EXPLORATION

Thought by many geographers to be the "Mountains of the Moon" to which Ptolemy and other ancient writers refer, numerous peaks in these mountains have been ascended by Henry M. Stanley, Sir Harry Johnston, and the Duke of the Abruzzi (see also page 180).

crowding close to its fellows and forming with them a crinkled mass so dense and flat that one could easily walk on their bowed heads.

Yet, in spite of its limb-to-limb struggles with the gales and the snows, it clings so earnestly to life that when the short springtime finally comes to its aid, it puts on a new uniform of fresh leaves and bedecks itself in the emblems of courage and victory, gay red and purple flowers, which challenge afresh the lashing winds and the inhospitable soil.

Not only does the whitebark pine fight well, but it fights long. Its highest tassel may come only to a man's waist-line. Standing by it and among its fellows, one might well think that of a sudden he had become a tree in stature, and the trees had been transformed into men in height.

One splendid veteran of scores of hard-fought campaigns was only three feet high. Yet when War Historian Muir interrogated it, the proud reply came that it had been holding its outpost for 426 years. Although its trunk was only six inches in diameter and its height that of a yardstick, it had been campaigning eighteen years when Columbus discovered America.

NATURE'S TRAINING CAMPS AND REST DEPOTS

As Muir climbed to the battle area he gave detailed accounts of the training camps and rest depots he passed en route:

"At an elevation of 6,000 feet above the sea, the silver firs are 200 feet high, with branches whorled around the colossal shafts in regular order, and every branch beautifully primate like a fern frond. The Douglas spruce, the yellow- and the sugar-pines here reach their finest development of beauty and grandeur. The majestic Sequoia is here, too, the king of conifers, the noblest of all the noble race. These colossal trees are as wonderful in fineness of beauty and proportion as in stature—an assemblage of conifers surpassing any other that has ever yet been discovered in the forests of the world."

Another excellent war correspondent of the timber-line struggle is Clarence King, from whose book, "Mountaineering in the Sierra Nevada," the author has

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A GRENADIER WHO HAS INTREPIDLY WITHSTOOD THE ASSAULTS OF THE ELEMENTS CANNOT RESIST THE BROAD-AX OF MAN

"THE BRAVEST OF THE BRAVE"

Staunch even in death, this outpost stands as a monument to its own defeat, on the slope of the North Cheyenne Canyon, Colorado.

Photographs by Photo-Craft Shop

THE THIN GREEN LINE: VETERANS OF A HUNDRED BATTLES ABOVE THE CLOUDS

They bend to the blast, but no blow of elements can cause their stout hearts to quail in their unequal fight to hold the Mount Baldy timber-line.

Photograph by Photo-Craft Shop

A STATELY SENTINEL ON THE FIRING LINE

The scene of the ceaseless struggle is "The Summit," near Pike's Peak, Colorado.

Photograph from James B. McNair

NO GIANTS THESE, BUT STAUNCH AND VALIANT FIGHTERS

Lodge-pole pines near the summit of Mount San Antonio, southern California, endure the blows of battle with stoic calm.

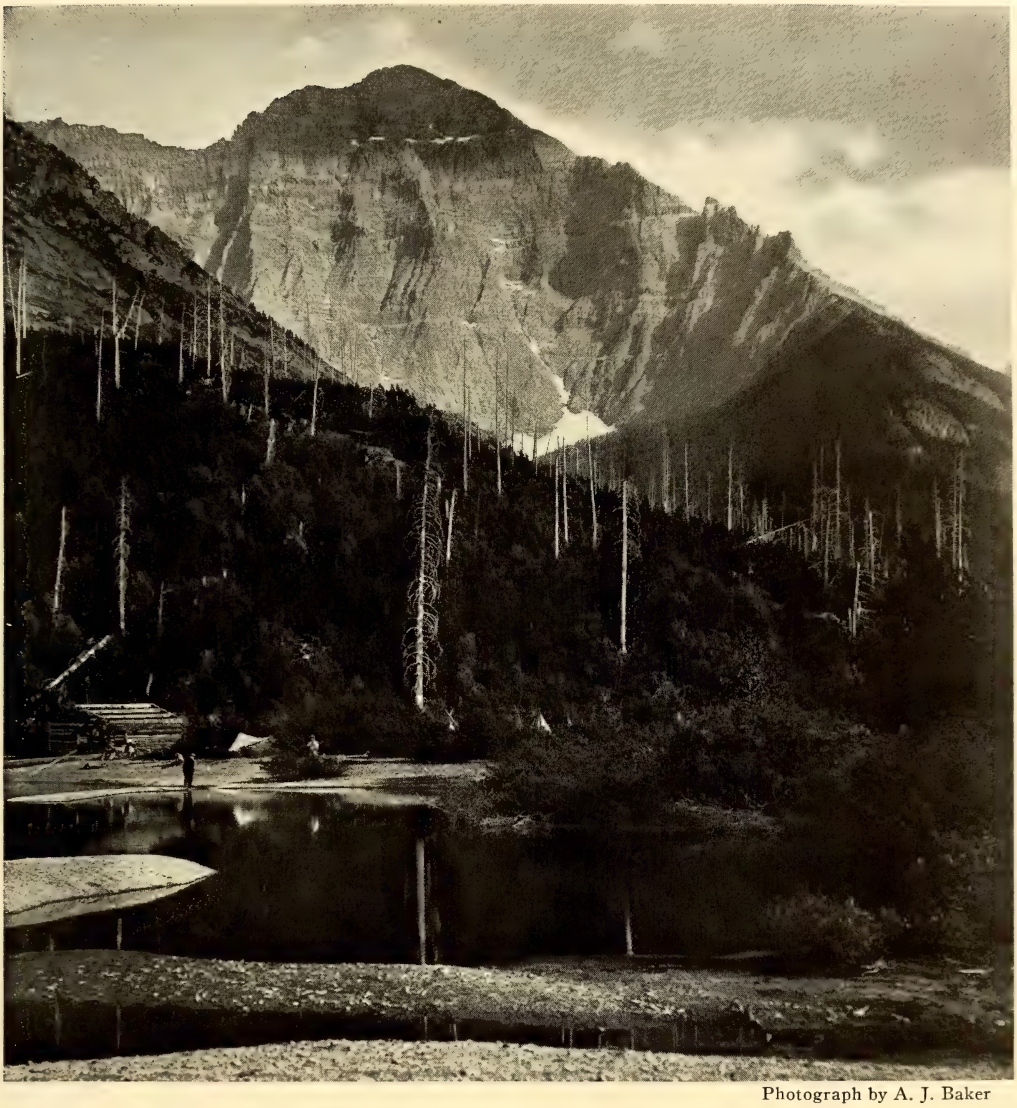
Photograph by Hugo Brehme

MOUNT ORIZABA, MEXICO, UP WHOSE SLOPES MARCH THE TREE HOSTS FROM THE TROPICS TO THE ETERNAL SNOWS

A hundred romances are concentrated in the story of the advance of the forest phalanxes from the base to the summit of this matchless peak.

Photograph by Vittorio Sella

CARRYING THE BATTLE INTO THE INHOSPITABLE HEIGHTS OF THE RUSSIAN CAUCASUS



Photograph by A. J. Baker

GHOSTS OF THOSE TREES WHICH FOUGHT THE GOOD FIGHT, BUT WERE CUT OFF IN THEIR PRIME: ON THE SLOPES OF MOUNT CLEVELAND, MONTANA

borrowed freely. Telling of the great forest areas that stretch along the Pacific Coast from California to Alaska, he relates how the trees arrange themselves with military precision, each species in strict accord with the laws of altitude and climate. Where low gaps in the Coast Range give free access to the western wind, the trees retreat toward the base of the mountains.

As one proceeds northward the conifers advance toward the coast, always seeking, whether climbing the mountain or approaching the sea, the conditions of terrain and climate best suited to their plan of campaign and style of attack. The tree that finds itself at home on the shores of Puget Sound, climbs up 6,000 feet into the Sierra in the latitude of middle California.

THE MILITARY HIGHWAYS FOLLOW THE HOLLOWS

The roads by which the trees advance to the timber-line usually follow the hollows that reach up toward the heights; for the howling winds that sweep over the unprotected ridges by which the

THE WIND HARP OF THE PINES ON FLATTOP, ROCKY MOUNTAIN NATIONAL PARK

This is a characteristic study of a wind-blown pine found at timber-line on the Flattop trail.

mountain is buttressed make them inhospitable lines of march.

Here, however, the Frost King turns loose his bombing squadrons, which drive down these mountain hollows with disastrous effect. Irresistible avalanches make massed assaults, crushing everything within their paths and gathering momentum as they go; they grind down every tree, often leaving their trunks to decay, half buried in the debris that the floods of rock and snow leave in their wake.

Yet, undeterred by the vengeance the foe has wrought on their elders, young trees spring up, take the places made vacant by the avalanche, and begin afresh a courageous but hopeless struggle for the possession of terrain claimed by the snow.

Conditions in the Rocky Mountain theater of war do not differ essentially from those obtaining in the Sierra, except that some types are missing from the tree armies here that are present in those of the Sierra — for instance, the Sequoia.

One finds that on the north side of Longs Peak the tree hosts have not been able to press the enemy as closely as on the south side. With the force of the wind somewhat broken and the support of the sun more pronounced, the forces trying to take the citadel of the mountain from the south are able to scale a thousand feet higher than those on the north side. Whenever they find a water-course they succeed in climbing higher than elsewhere.

On Mummy Mountain one finds at timber-line that the black spruce is holding the redoubts. Often the trunks of the trees are nearly two feet in thickness, while their height brings their topmost branches only to the shoulders of the war correspondents who chronicle their struggles.

WHERE MOUNTAIN FORCES ARE AIDED BY POLAR HOSTS

Many distinguished writers have visited the Selkirk theater of war in Canada and have given careful pen pictures of the struggle there. In height, the prevalence of glaciers, and the existence of per-

Photograph from John C. Gifford

A DEMONSTRATION OF EXPERT "SAPPING" IN ONE OF THE BASE CAMPS OF THE FOREST FORCES: CUTLER, FLORIDA

The tree must be a sapper and miner if it would withstand successfully the onslaughts of the enemy. This particular forest fighter will never be called upon to undergo the shock of snow and hail assault, but a wonderful example of nature's tactics is here shown. Through the spokes of a wagon wheel this rubber tree has sent its sinuous roots, grappling itself to earth as if it feared the irresistible attack of a hurricane.

petual snow-fields, the Selkirks resemble the Alps. In ascending beyond 5,000 feet, the balsams and the spruces—the dominant species of the sub-alpine forest—begin to break up into little groups, separated by shrubs. At 7,500 feet there are still small groups holding the first-line trenches. Frequently the center of one of these groups is a strong and sturdy spruce, the "non com" of the little force of small balsams gathered round it.

C. H. Shaw, another observer at the front, gives a striking picture of the result of the attacks of snow upon the trees at timber-line in the Selkirks. He says:

"In the forest near timber-line, the snow was absent only at the spots occupied by the groups of trees into which the forest was becoming resolved. No doubt less snow had accumulated there, and the trees themselves, being dark objects, probably hastened the melting of that which did accumulate; but the relation was none the less significant. Passing higher up, where the snow was heavier, the tree groups were more widely separated, and more sharply confined to spots where the local contour had prevented the snow from accumulating to great depths.

"Thus the forest was broken into scattered patches of trees, standing mostly on mounds and hillocks. The vicinity of each group was occupied by numerous small trees, and all except the most sheltered bore battle scars proclaiming their struggle with the snow. Only their tops were in a healthy condition."

"STANDING IN SNOW UP TO THEIR NECKS"

In other words, standing in snow up to their necks during the cold winter months, it seems that the trees contracted a sort of "trench foot" trouble of their own. Under such circumstances all sorts of conditions battled on the side of the

Photograph by Robinson-Matlack Company

THE FIGHT AT SEA-LEVEL

Along Florida's palm-fringed coast, where the trees must defend themselves against the ever-blowing trade winds, now and then backed by an angry sea.

forces of Frost. The buried branches were smothered as effectually as though there had been a gas attack; unable to breathe, they could not throw off the fungi *mycelia,* the trench rats of their battle line.

Some conditions obtain on the Andean battle front that do not apply elsewhere. In the tropical Andes one finds the cinchona trees, from which the quinine of commerce is derived. From their southern range to their northern limit these trees cover nearly thirty degrees of latitude, or approximately eighteen hundred miles. They never venture lower than 2,500 feet above sea-level, though they frequently climb as high as 9,000 feet; but at the latter altitude they drop out, leaving to elfin trees and shrub wood the march to the higher reaches. On the broad, desolate steppes of the alpine belt there often appear isolated, gnarled dwarf trees of the species *Polylepsis lanuginosa.*

In none of the other theaters of war where the trees and the frost meet in

© Asahel Curtis

TIMBER OUTPOSTS ON GUARD IN TATOOSH PARK

In the background rises Mount Rainier, the pride of the State of Washington, impregnable to the attacks of the tree hosts.

death grapple on the eery slopes of high mountains do the trees have to make their last stand so far from the summits that are their objectives as in the Himalayan war zone.

COMMUNIQUÉS FROM THE HIMALAYA BATTLE LINE

There are many sectors and salients in the timber-line of the Himalayas, and it will be interesting to epitomize some of the communiqués that come from them. Mr. and Mrs. Workman, in their "Two Summers in the Ice-wilds of Eastern Karakorum" and their "Ice-bound Heights of the Mustagh," give some interesting pictures of the marching hosts that carry the warfare of the trees into the clouds. At Kapaln a rajah took them into his garden and showed them a walnut tree only two feet high that already was in bearing. That year it had produced a crop of three walnuts.

At another place they found evergreen trees, mostly cedars, boldly clinging to positions in niches in the vertical or

Photograph by Vittorio Sella

ENCOUNTERING A GAS ATTACK

The Weather Gods from the snow-clad summit have sent down chilling currents which cause an obscuring blanket of clouds to spread over this unnumbered host of trees encamped on west Uganda heights.

AN ENVELOPING ATTACK OF THE FOREST FIGHTERS: FROM RIGHT AND LEFT THE TREES ADVANCE IN THEIR EFFORT TO GAIN A FOOTHOLD ON THE HEIGHTS

A scene along the Pike's Peak Automobile Highway, which ascends the rock-walled sides of the mountain above timber-line in ten immense swings. Dynamite was used to blast the highway in the unyielding rock, where the tree forces were finally defeated.

nearly vertical rock faces of mountains where there seemed to be no soil and where it appeared impossible for water to remain.

And yet their morale must have been at high-water mark, for their luxuriance would have done credit to that of trees in the most favored positions far down the mountains. And this was at an elevation of 13,000 feet. There were also deciduous trees, resembling mulberries, clinging to similar positions with a vigor and vim that made them the world's most famous alpine warriors. Even the willows continued in ranks up to 11,500 feet, and at 14,400 the last struggling bush proclaimed that it was holding the most advanced outpost in the whole line.

THE TRUCELESS WAR GOES ON IN JAVA, THE ALPS, AND AFRICA

One might find thrilling stories of the truceless war on the timber-line in many another isolated area. In the mountains of Java, on the slopes of the Ruwenzori of Africa, in the Alps of Europe, in the mountains of New Zealand, in a hundred areas, the age-long struggle goes on. Every species of tree that we know pushes just as far skyward and poleward as it can live. Each species finds its place in the general scheme, all maintaining a united front and a solid support against whose morale no efforts of the common enemy avails.

It does appear true, however, that during generations past the forces of Frost have won some little ground from those of the trees. From many regions there come reports of the dead bodies of trees that held positions in advance of any that are now living. How this ground was taken no one may ever know.

There are other timber-lines than the one which Frost draws saying to the trees, "They shall not pass!" Just as the Incas drew back into Machu Picchu—into an isolation where no enemy might pursue—so, many species of trees, weary of the fierce competition of the open forests, seek refuge in tracts where competitors cannot come. Some of them invade the desert, preferring its burning thirst to the strenuous struggle of the thick forest; others find their place in the grassy plains, where most trees are unable to gain a foothold.

MAN PROVES AN ALLY OF FROST

Sometimes man proves an ally of the forces that try to limit the boundaries for the trees. The so-called Alpine pastures of the Cévennes, in France, are not, indeed, above the timber-line at all. Rather, they are merely grass-covered clearings, where the trees were destroyed so long ago that the memories of the natives run not to the contrary.

In many parts of the world woodland and grassland oppose one another as rigorously as two hostile nations of equal strength, locked in a stalemate. The trees do their best to expand their kingdom at the expense of the grass, but the grass holds its front-line trenches in a way that is wonderful to behold. Whoever has seen the tree-line on the prairies of North America, the pampas of South America, the steppes of Asia, the veldt of Africa, or the plains of Australia must be impressed with the hardihood of the grassy Davids that lay low the tree kingdom's Goliaths.

No one can follow the armies of the trees around the world without gathering a keen impression of them as soldiers. So well are the different classes of troops trained that there are forces for every front. The way they meet the fighting conditions of the sectors they are severally called upon to hold—whether in cold Siberia or in the tropics, whether on polar plain or mountain summit, whether on the edge of the desert or the rim of the world—shows an adaptability to environment and circumstance that makes no mean contrast with the applauded gifts of man himself to carry war where he will.

INDEX FOR JANUARY-JUNE, 1922, VOLUME READY

Index for Volume XLI (January-June, 1922) will be mailed to members upon request.

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THE LINCOLN MEMORIAL AND ITS REFLECTING POOL, SEEN FROM THE TOP OF THE WASHINGTON MONUMENT

"Here on the banks of the Potomac, the boundary between the two sections, whose conflict made the burden, passion, and triumph of his life, it is peculiarly appropriate that it should stand. Visible in its distant beauty from the Capitol, whose great dome typifies the Union which he saved, seen in all its grandeur from Arlington, where lie the Nation's honored dead who fell in the conflict, Union and Confederate alike, it marks the restoration of the brotherly love of the two sections in this memorial of one who is as dear to the hearts of the South as to those of the North" (see page 204).

Photograph by U. S. Army Air Service

THE LINCOLN MEMORIAL DEDICATION EXERCISES, MAY 30, 1922

"For ten years the structure has been rising. From the solid rock beneath the level of the Potomac, 50 feet below the original grade, it reaches a total of 122 feet above that grade. The platform at its base is 204 feet long and 134 feet wide. The proportions of the Memorial are so fine that its great mass and height and length and breadth are suppressed in its unity."

Photograph by Maynard Owen Williams, National Geographic Staff

THE LINCOLN MEMORIAL IN WINTER

"It is well that half a century should pass before his people's national tribute to him takes form in marble, that it should wait until a generation instinct with the growing and deepening perception of the real Lincoln has had time to develop an art adequate to the expression of his greatness."

Photograph by Charles Martin, National Geographic Staff

THE LINCOLN MEMORIAL, WITH THE WASHINGTON MONUMENT, AND THE CAPITOL AND NATIONAL MUSEUM DOMES IN THE DISTANCE

"The outside columns are the simple Doric, the inside columns the simple Ionic. The marble of the structure is from the Colorado Yule mine, remarkable for its texture and the purity of its white, and for the size of the drums which make the columns noteworthy in the architecture of the world."

IN THIS TEMPLE
AS IN THE HEARTS OF THE PEOPLE
FOR WHOM HE SAVED THE UNION
THE MEMORY OF ABRAHAM LINCOLN
IS ENSHRINED FOREVER

Photograph by Charles Martin, National Geographic Staff

"HERE IS AN ALTAR UPON WHICH THE SACRIFICE WAS MADE IN THE CAUSE OF LIBERTY"

"The statue is the work of Daniel Chester French, one of our greatest sculptors. It fills the memorial hall with an overwhelming sense of Lincoln's presence, while the mural decorations of another great American artist, Jules Guérin, with their all-embracing allegory, crown the whole sacred place."

Photograph by Charles Martin, National Geographic Staff

THE INTERIOR OF THE MEMORIAL AND "THE COLOSSAL FIGURE OF THE BELOVED IN GEORGIA MARBLE"

© Ernest L. Crandall

THE LINCOLN MEMORIAL, AT THE END OF THE AXIS OF THE MALL, REFLECTED IN THE WATERS OF THE TIDAL BASIN

Photograph by Charles Martin, National Geographic Staff

THE LINCOLN MEMORIAL IN CHERRY-BLOSSOM SEASON

"'Lincoln, of all Americans next to Washington, deserves this place of honor. He was of the immortals.'" [Text, pages 197-204, extracted from the address of the Honorable William Howard Taft, Chief Justice of the United States and Chairman of the Lincoln Memorial Commission, in presenting the Memorial to the President of the United States, May 30, 1922.]

THE ARCTIC AS AN AIR ROUTE OF THE FUTURE

By Vilhjalmur Stefansson

THE map of the Northern Hemisphere shows that the Arctic Ocean is a huge Mediterranean. It lies between the continents somewhat as the Mediterranean lies between Europe and Africa. In the past it has been an impassable Mediterranean. In the near future it will not only become passable, but will become a favorite air route between the continents, at least at certain seasons—safer, more comfortable, and consisting of much shorter "hops" than any other air route that lies across the oceans that separate the present-day centers of population.

We shall "soon" be booking our passage from New York to Liverpool, or London to Tokyo, by dirigible or plane in as matter-of-course a way as we now book our passage by steamer. As to how far in the future that period lies, our estimates differ according to our temperaments.

When Tennyson spoke of the "aërial navies grappling in the central blue," he was a poet and a prophet, for no inventions were then available the mere development of which could make such dreams a reality. When we now speak of the coming transoceanic air commerce, we are no longer prophets, for we are merely considering the daily and yearly increase in efficiency of inventions which we now have.

The thought is, however, in the back of our minds that, in addition to such increasing perfection of known instruments, we shall eventually have also entirely new devices that are at present as much in the future as were even the crudest approaches to an aërial navy in the time of Tennyson.

FLIGHT BY WAY OF NORTH CAPE

Although our estimates of when transoceanic air service shall be no longer a novelty differ according to our temperaments, they vary only between years in the vision of the optimist and decades in the gloomier view of the pessimist.

But whenever the time of regular transoceanic air commerce arrives, there will be in England not only those who desire to book passage by air for New York, but also others who have pressing affairs awaiting them in Tokyo.

Then will arise the choice of routes, and in the summer season at least it will be thought an absurdity for those in a hurry to go from England to Japan by way of either New York or Montreal. They will fly by way of the North Cape of Norway and Novaya Zemlya.

Since the days of Magellan it has been a commonplace that you can go east by sailing west. It is about to become an equal commonplace that you can go east by flying north.

The days of Columbus and Magellan were in Europe days of intellectual renaissance. People had not generally known even that the world was round; but when that novel view once was presented, they drew from it all its proper conclusions. One of the most fruitful of these was that you could reach China not only by sailing west, but also by sailing north, and it was soon realized that the shortest route from Europe to China was a northerly one. In navigation we call this the principle of great-circle sailing.

NORTHWEST PASSAGE NOT PRACTICAL FOR SHIPS

But in certain places lands barred the way of the navigator, and everywhere the "frozen ocean" hindered the ships.

There was failure after failure of great expeditions, until finally it was agreed that although a northwest passage was possible, it was not a "practical" route, and that neither time nor expense could be saved by using it.

Before the days of the Suez and the Panama canals, it was cheaper and safer to sail around the Horn or the Cape of Good Hope than to navigate the northwest passage around America or the northeast passage between the Pole and Asia. Although the difficulty of making

Drawn by A. H. Bumstead and James M. Darley

A SKETCH MAP OF THE NORTHERN HEMISPHERE SHOWING PROPOSED ROUTES OF AIRCRAFT OVER THE ARCTIC ZONE

For many centuries, explorers, sailing in the interest of commerce, sought Northwest and Northeast Passages to the Far East. After many failures which proved costly in lives and ships, both arctic routes were discovered, but the perils of the tortuous passages through icy seas far outweighed any advantage of shorter distance. Now, new northern passages are contemplated — passages through the air from northern North America to northern Europe and Asia; the Old and New Worlds are only a few "hops" apart, as the airplane flies. The northern continents, separated by the Arctic, seem, in the vision of the airman, not much farther apart than are Africa and Europe, separated by the Mediterranean, or North and South America, separated by the Caribbean.

these northerly voyages is in the public mind grossly exaggerated, the fact remains that for surface craft these really are not "practical" routes from the commercial point of view.

Although realizing the applicability of aircraft to commerce and warfare in our own latitudes, we have not adequately realized their significance in solving, after four hundred years, the problem of the northwest passage and giving us at last a short route from Europe to the Far East. Whether it be in five years or in fifty that aërial transoceanic commerce in tropical and temperate latitudes becomes a commonplace, transpolar commerce will then be equally common for at least the summer months.

At present, passenger liners in crossing the Atlantic have winter routes that differ sometimes by several hundred miles from their summer routes. Aircraft will doubtless be even more free in their variations of route according to season. Indeed, it is probable that the weather bureaus, which will by then have multiplied at least by ten their present great importance to commerce, will publish daily or several times a day maps of the air routes, the information of which will be conveyed by wireless messages to the commanders of aircraft, enabling them to vary from hour to hour the courses they steer, as to latitude and longitude and altitude.

THE AIRMAN MAY CHANGE HIS WIND

With the sailor on the ocean it is, outside of the trade-wind belt, almost a matter of accident whether the winds blow him fair or foul, but in the air there may be a fair wind a certain distance up and a head wind either higher or lower.

The airman may change his wind from fair to foul by raising or lowering his craft. It is, therefore, impossible to say now just where the transpolar air routes will lie, and indeed they will probably always vary from day to day. But, wherever they lie, they are sure to be advantageous commercially and popular with passengers, at least during the season corresponding to that in which the tourist of today sails to Alaska or Norway or Spitzbergen to see the midnight sun.

For the coming popularity of the transpolar air routes from North Europe to eastern Asia and from North America to northern Asia there are four main reasons. We shall consider these in their relation to the needs of a passenger who wants to go from England to Japan.

The first advantage of the polar route is its shortness. The most practical route of the recent past has led from England by way of ocean steamers to Montreal, the Canadian railways to Vancouver, and then by the northerly steamer route along the Aleutian Islands to Japan. This route is approximately 11,000 miles from Liverpool to Yokohama. But the distance from a railway terminus at the north of Great Britain to the north end of Japan proper, where railway travel could be again resumed, is by air route only 4,960 miles, or about half the present regular route between the two countries.

IMMENSE SAVING OF DISTANCE

To a man in a hurry, whether for personal transportation or the transportation of urgent dispatches, a saving of half the distance, meaning also saving of half the time, will in some cases be extremely important. But the route has other advantages, which in other cases may be even more attractive.

Economy in hydrogen is the second important advantage of the polar route. It is said that helium is for dirigibles a preferable gas, not only because it will not explode, but also because it does not expand rapidly with heat. However, helium is at present exceedingly rare, so rare that even were the costliness of it no consideration, we would still be at a loss to see how any considerable number of dirigibles could be operated with that gas.

Paint the bag silver or any color you will, the amount of heat locally generated by the sun's rays striking the dirigible is great. The hydrogen expands, and there is no practical way as yet conceived which can avoid the loss of gas.

You can avoid a bursting of the bag only by allowing the gas to escape. This is the chief factor which limits the length of balloon voyages. A certain amount of gas is lost each day and reciprocally a certain amount of ballast has to be thrown out each night to prevent the balloon from settling to earth.

But the alternation of day and night, which seems a necessary evil to those habituated to southern latitudes, is not a

Photograph by Captain C. T. Pedersen

A SIBERIAN SKIN CANOE WITH COVERING OF SPLIT WALRUS HIDES

"Of what practical benefit is Arctic exploration?" is a question often asked by the utilitarian, unimpressed by scientific research and investigation. The adaptation of the explorer's knowledge of the Polar regions to the needs of the passenger-carrying Arctic airman will be one answer to this query.

factor in the polar regions, whether in midwinter, when it is always dark, or in midsummer, when it is always light. We shall, for the present, consider only summer journeys.

The speed of the dirigible that has already crossed the Atlantic was great enough so that, had it started north from Scotland with a full supply of hydrogen just after a spring sunrise, it could have reached the area of perpetual daylight, near Iceland, in fifteen or twenty hours.

This means that such a dirigible would not be overtaken by darkness at all in the beginning of its trip and would meet its first night only after crossing the polar area and penetrating well into Asia. On the major portion of the voyage from England to Japan, there would, accordingly, be no great expansion or contraction of the hydrogen, no considerable loss of buoyancy or necessity for throwing out ballast, giving not only an increased cruising radius to the dirigible, but also an increased freight - carrying capacity.

In air voyages no less than sea voyages, things will doubtless occasionally go wrong. This brings us to the third great advantage of the northern route.

Photograph by Captain C. T. Pedersen

FORCING A WAY THROUGH THE SMALL FLAT ICE IN THE BERING SEA IN EARLY SPRING

The presence of relatively stable ice-floes in the polar ocean would be an advantage to aircraft in case of forced landing. Cakes of ice would serve as life-rafts (see text, page 211).

Photograph by Captain C. T. Pedersen

AN ARCTIC MOTHER AND HER TWINS

This polar bear was killed after it took to the water, and the two cubs were lassoed and brought to San Francisco.

If you get into trouble, you would rather that it happened in daylight than in darkness.

In stories of sea tragedies, the stoppage of the engines, the failure of the light plants, and the plunging of the whole ship into inky darkness are often the most terrifying features. Just when a crisis brings the need of swift and pertinent action, every effort is thwarted because no man can see what to do or what others are doing. Under the perpetual sun of the polar summer, we shall always be free from at least this attribute of southern tragedy.

ICE-FLOES AS LIFE-RAFTS

On the polar route, although the surface of the sea may not be more than half covered by substantial cakes of ice, there would be a reasonable certainty of landing on one of them. Were there a forced landing in open water, it would presumably not be more than a few miles from the nearest ice-floe, which could be reached by such life-rafts or other devices as a dirigible would naturally carry on a transatlantic voyage in southern latitudes. Thus, the presence of stable ice-floes in the polar ocean is the fourth great advantage of this route.

The temperature on the ice-floes in summer is usually warm enough for comfort, when one is dressed in spring or fall (medium) clothing; occasionally it is uncomfortably warm. This latter fact will not seem at all surprising to mountaineers who have suffered from the summer sun on the slopes of snow-clad mountains.

It may be said that it would not be any fun to be forced to land on an ice cake; but it would be a great deal more fun than having to land among tumbling and breaking seas in the mid-Atlantic.

One effect of scattered floes is that even in a gale there are no heavy seas. Indeed, if the ice is abundant, no swell is noticeable in the heaviest gale, and the waves on the patches of open water are only such as one may find on a pond or a small lake.

If S. O. S. calls containing, as they always do, position as to latitude and longitude are sent out while the dirigible or plane is descending to the ice or immediately after the landing, the party would have days or weeks, and even months, for opportunities of rescue.

Some of the enthusiastic advocates of air travel say that we shall eventually have in mid-Atlantic huge rafts — floating islands, in effect—that will be rescue stations for aircraft in distress. While that device may not be impractical, it will at least be difficult and expensive.

On the polar route, Nature has already provided a sprinkling of rafts far greater in number and far more stable than any such artificial rafts can ever be.

If not a fifth great advantage, at least a contributory merit of the polar route will be "The Midnight Sun" and kindred marvels, which can be exploited from the tourist point of view by the air liners of the future no less than they are by the tourist boats of today.

The transpolar route will become more important decade by decade. In Siberia we have as yet only one great trunk railway. It does, however, tap and make accessible many of the mighty rivers that flow north, and there are great steamers on these rivers that make the Arctic locally accessible.

The Trans-Siberian Railway runs in large part through the wheat belt of Asia, and the potential cereal belt extends far north of it. We shall, accordingly, have eventually the development of other great east and west railways and of many spurs running north and south. Tomsk, Yakutsk, Irkutsk, and the rest of the cities we have heard of, and many of which we have never heard, will be growing into Chicagos and Winnipegs and Calgarys.

CENTERS OF POPULATION WILL MOVE NORTHWARD

The centers of civilized population in Siberia and in Canada alike will be continually moving north, and there will be more and more occasion for the use of the polar route.

To people little acquainted with the Arctic, as most of us are, and misinformed, as nearly all of us are, there appear to be many arguments against the polar route. Few of these rest on any reality. Indeed, where we imagine positive difficulties, there may be positive advantages. Take, for instance, the matter of summer temperature.

Photograph by Oscar Halldin

SEA-GULLS, GREEN BAY, SPITZBERGEN

The birds took flight when the photographer sneezed.

We have all of us learned in school that, per square mile per hour, there is more heat received from the sun at the earth's Equator than anywhere else; but in the minds of most of us this truth is only a half-truth, and therefore the most dangerous sort of error, for we have commonly failed to grasp its interpretative corollary, that while each hour of sunlight brings most heat to the Equator, the hours of sunlight per day in summer increase in number as we go north.

WHEN THE ARCTIC GETS MORE HEAT THAN THE EQUATOR

This would give a perfect balance if the sunlight lengthened proportionally as the heat per hour lessened. That is not the case. As you go north, the length of day in midsummer increases more rapidly than the amount of heat per hour decreases; so that, although the heat per hour received at Winnipeg is less than it is in New Orleans, the amount of heat received per day is greater. That is one reason why Winnipeg is frequently hotter than New Orleans in July.

For something like five weeks every summer more heat per day is received from the sun on a square mile in the Arctic than at the Equator. If the North Pole were located on an extensive low land, remote from high mountains or any large bodies of water, it would be about as hot as the Equator on the Fourth of July. There is, however, at the Pole and in many places in the remote north a local refrigeration that tempers what otherwise would be unbearable heat. The winters are long, and under certain conditions a great deal of "cold" may be stored up.

In the polar basin we have an ocean thousands of miles across and thousands of feet deep, and all this water during the long winter is chilled to the vicinity of 30° Fahrenheit above zero.

There is also a certain amount of ice floating around on the surface. We have, therefore, a vast store of "cold" to neutralize the terrific downpour of the summer sun's heat, and it is probable that the air ten feet above the middle of the polar ocean is seldom warmer, even in July, than 50° or 55° Fahrenheit above zero. Higher up it would be somewhat warmer.

This means that conditions of flying, so

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SPORT IN THE ARCTIC: ROPING A POLAR BEAR FROM THE SIDE OF A BOAT

far as temperature is concerned, would be about the same over the polar ocean in July as they would be in France or England in late winter or early spring.

Greenland is peculiar among the polar lands in that its great altitude enables it to store up a large amount of "cold." In a few other northerly islands there are glaciers of moderate size (Franz Josef Island, Spitzbergen, North Devon) and glaciers of intermediate size (as in Ellesmere Island and Heiberg Island), but there are vast areas of polar lowlands where the little snow that falls in winter (commonly much less than the snowfall of Vermont or Scotland) disappears like magic in the early spring, and where the sun beats down for month after month upon a soil clad with vegetation.

LESS PERMANENT SNOW IN NORTH SIBERIA THAN ON MEXICAN MOUNTAINS

We can take it for certain that there is far less permanent ice and snow in the lowland of north Siberia than there is in the mountains of Mexico. It is even possible that tropical Africa, with its one or two snow-clad mountains, contains more permanent snow than do all the lowlands of arctic Siberia.

In arctic Canada we have ice-free lowland everywhere except in the Yukon.

In Siberia and Canada there is, therefore, an aggregate area much larger than the whole of the United States where there is no stored-up "cold" to moderate the heat of the arctic daylight, except the slight chill of the frozen subsoil. This is kept from having much effect on the air by the insulation over it of the cloak of vegetation.

Accordingly, we find that at Fort Yukon, in Alaska, north of the Arctic Circle, the United States Weather Bureau has recorded the temperature of 100° in the shade. No thoughtful person will, therefore, suppose that transpolar air journeys will in summer be interfered with by low temperatures. Neither will it be uncomfortable because of extreme heat, for that can always be regulated by the airship's rising high enough into a cooler air.

It is true that parts of the polar regions are given to summer fogs, but fogs lie low over the ocean and presumably the dirigibles and airplanes would navigate in the clear sunlight above them.

In our consideration of transpolar commerce we come naturally to the matter of

Photograph by Carl J. Lomen

ALASKA "COTTON": A VIEW OF THE TUNDRA IN THE NOME COUNTRY

This top grass (*Eriphorum*) is one of the principal plants in the revegetation of low regions near ponds in the district covered by the ash of the Mt. Katmai volcanic eruption.

Photograph from Aine Kildal

CAUGHT IN THE PACK ICE

One of the reasons why the Northwest Passage, when discovered, proved of little value to commerce.

Photograph by Captain C. T. Pedersen

A WHALE TURNING FLUKE: NOTE THE ARCTIC WHALEBOAT IN THE DISTANCE

base stations, where petroleum and food and rescue aircraft, corresponding to the coast guard vessels of today, will be kept in constant readiness.

HOW BASES CAN BE SUPPLIED WITH FUEL AND FOOD

These base stations will be supplied by railways, by ocean steamers, or by river steamers. A glance at the map of the polar air routes shows that they require few long jumps between places that are now reached with fair regularity by ocean or river steamers.

How accessible are many of the seemingly remote fur-trading outposts of arctic Canada and Siberia few of us realize.

It would take only about 25 days to make the journey to-day from New York to the mouth of the Mackenzie, 200 miles north of the Arctic Circle in Canada, and regular railway and steamboat tickets could be bought, if not in New York, at least in Winnipeg or Edmonton.

Under normal peace-time conditions a similar surprise would await those who desired to reach the north coast of Siberia by journeying in steamers from the Trans-Siberian Railway down one or another of the great north-flowing Asiatic rivers.

It goes without saying that where the air route touches the north of Norway or the north Pacific coast of Asia the problem of supply is even simpler.

The islands that dot the polar ocean will obviously become important relay stations on the various transpolar routes.

It may be said about them in general and about the north coasts of Asia and America that they are now far more easily accessible by steamer than the public realizes. This accessibility will be doubled by improvements in our ice ships and by the increase of skill and decrease of fear on the part of our sailors. It will be doubled again by the location at difficult points of wireless stations to give captains advance news of ice conditions and by pilot airplanes to pick out ice-free routes that ships may follow.

STRATEGIC POINTS EASY OF ACCESS

It will be so easy for ships to supply the strategic points in the polar regions that few of the polar airways will have to be far diverted from the theoretically preferred short routes to seek out-of-the-way places to get petroleum or other supplies.

As the cereal belts of middle Canada and middle Siberia are increasingly cultivated, great cities will grow up nearer and nearer the Arctic. We have their beginning already. Thirty years ago Edmonton, for instance, was a village supposed to be too far north ever to become anything but what it was, a fur-trading post; today it is a city of 60,000 inhabitants. The oil fields of the lower Mackenzie, where the Standard Oil Company has extensive operations, and the copper district north of Great Bear Lake already hold a definite promise as commercial centers.

It may be of little beyond academic interest this year that the air route from the northern railway terminus on the Athabasca River north of Edmonton to Archangel, in northern Russia, is only 3,946 miles; but as the railway continues to push its way northward through Canada this route between railheads on opposite continents will gain in importance as it becomes shorter and as the communities that depend upon it grow.

FEASIBLE ROUTES FROM CANADA TO RUSSIA

Steamers have been running to the mouth of the Mackenzie for several decades already. The journey from the present railhead to the mouth of the Mackenzie can even now be made in fifteen days. It is significant, therefore, that from the mouth of the Mackenzie the air route by which one may penetrate the interior of northeastern Siberia through the great rivers of the Kolyma system is only 1,541 miles by way of Point Barrow and Wrangel Island, and that the longest hop, from Point Barrow to Wrangel Island, is only about 450 miles.

By branching off at Wrangel, you can reach the mouth of the Lena, one of the world's greatest rivers, in a total distance from the Mackenzie's mouth of 2,208 miles and with the longest single hop, from Wrangel Island to Holy Cape, of about 750 miles.

An air route without any jumps longer than 555 miles lies from the mouth of the Mackenzie by way of Prince Patrick

Island, Borden Island (discovered by the Canadian Arctic Expedition in 1915), Grant Land, Greenland, and Spitzbergen to North Cape, Norway, a total distance of 2,745 miles. From North Cape, Petrograd overland is 788 miles.

These are but small fractions of the distances that have to be traversed between any of these places by the present land and water routes.

The shortest air route from the north of Great Britain to the north of Japan is about 4,960 miles, as against 8,542 for the present London-Tokyo rail and steamer route (or 11,236 miles via Montreal). But, as shown above, the polar route has several advantages above the others besides shortness.

A disadvantage of the shortest possible route from England to Tokyo is that it is not sufficiently northerly to give the maximum amount of daylight, for only about half of the journey lies north of the Arctic Circle.

THE MOST FEASIBLE FLYING ROUTE

To get a greater benefit from the perpetual daylight of the arctic summer, a route might be laid from Scotland to the east tip of Iceland; thence by way of Jan Mayen Island, the summer hotel already established in Spitzbergen; then Franz Josef Land, Emperor Nicholas II Land, or Cape Chelyuskin, and thence overland to Japan.

This route is only a few hours' flying longer than the shortest possible route.

How easy a route this will be with the better airplanes and dirigibles of the future is seen if we compare it with the far more difficult things already done with the appliances of two years ago that are fast becoming obsolete.

The British biplane that crossed the Atlantic had to make a single "hop" of 1,960 miles from Newfoundland to Ireland; the N-C4 made a hop of 1,240 miles from Newfoundland to the Azores; Sir Ross Smith in 27 days 20 hours elapsed time flew 11,500 miles from England to Australia, with a longest single hop of 712 miles, and average hops of 412 miles.

Compare this with the longest hop of 976 miles on the London-Tokyo short (or polar) route of 6,300 miles.

If Sir Ross Smith, with a plane that has been and will be improved upon, has already done these greater things, the solvability of every problem of the London-Tokyo route is not to be supposed difficult.

As the centers of population continue to move north in Canada and Siberia, the importance of the transpolar air routes will correspondingly increase.

Whoever grasps at all the vast natural resources of the polar lands and seas and understands the conditions under which they are already beginning to be developed will have fascinating dreams about any number of transarctic air routes destined to come into every-day use whenever air travel in general becomes a commonplace on the more dangerous and difficult but already speculatively accepted routes between Liverpool and New York, San Francisco, Hawaii, and Japan.

VOL. XLII, NO. 3 WASHINGTON SEPTEMBER, 1922

THE NATIONAL GEOGRAPHIC MAGAZINE

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A LONGITUDINAL JOURNEY THROUGH CHILE

By Harriet Chalmers Adams

Author of "Picturesque Paramaribo," "Kaleidoscopic La Paz," "The First Transandine Railroad from Buenos Aires to Valparaiso," "Cuzco, America's Ancient Mecca," "Rio de Janeiro, in the Land of Lure," in the National Geographic Magazine

OUR friends in Antofagasta, on the arid coast of northern Chile, urged us to continue the journey south by sea.

"So much easier than the long, dusty railroad trip," they said.

But some years before we had made the voyage, visiting the ports of this elongated country, whose amazingly diversified shore, extending through nearly thirty-nine degrees of latitude, is exceeded in length only by Canada and Brazil.

This time we decided to travel on the longitudinal railway, from its beginning, in the dreary desert, to its dropping-off place, on the wooded shore of the Gulf of Ancud. Few, save the Chileans themselves, make this comprehensive journey, from the rainless region of the north to the rich agricultural heart of the country, and on through the magnificent forest and river lands, long held by the valiant Araucanian Indians, to that enchanting mountain and lake region unrivaled in beauty the world over.

Still farther south, reached by coasting vessel, lies the wild territory of Chiloé, with its curiously denticulated coast and forest-fringed fjords; forbidding Magallanes, a network of channels and archipelagoes, with majestic glaciers slipping into a leaden sea; and little-known Tierra del Fuego, whose unique pasture lands support two million heavily fleeced sheep, supplanting the dappled guanaco on the southernmost range of the world.

Chile, the only South American country lying altogether west of the Andes, is 2,627 miles long. Placed east to west across the United States, its sword-like body, varying in width from 105 to 223 miles, would stretch from the Singer Building, in New York, to the City Hall, in San Francisco, and extend over 50 miles into the Pacific Ocean.

Geographically it is much like our Pacific coast reversed. Alaskan fjords are paralleled in the Magallanes country. Where we have northern forests in the State of Washington, Chile is arid; where we have southern deserts on the Mexican border, Chile is forested.

The long agricultural valley of Chile, alternating between grainfields and vineyards, corresponds with the "Sunny San Joaquin," in California, where I was born; and the climate of the more densely inhabited portions of this southern republic is not unlike the sparkling, sun-drenched atmosphere of our own Golden West.

Our Antofagasta friends have a garden in the desert. My bedroom window, high up in the tower, commanded a view of the town. Walls and roofs as colorless as the sand were unrelieved by a tree or a blade of grass; yet, just under my window, the barren soil had been touched by the magic

Photograph from Harriet Chalmers Adams

TOCOPILLA, A NITRATE PORT IN THE NORTHERN DESERT OF CHILE

The coast range of the Andes in this region rises abruptly from the sea, with an occasional narrow strip of land on which a town is set. Water is brought a great distance by pipe-line from the river Loa.

wand of irrigation. Here firs and eucalyptus towered above bamboos and oleanders, and pomegranate and fig trees were heavy with fruit. In the shade of the grape arbor the breakfast table was laid.

Water is brought 250 miles by pipe-line from the Bolivian Andes. One night the Chinese gardener left the faucet open, and by morning forty dollars' worth of the precious fluid had been consumed by the thirsty sand.

MOUNTAIN PEAKS USED FOR SUN DIALS

Irrigation in these lateral coastal valleys, lying between the Andes and the Pacific Ocean, dates back to pre-Spanish days. Then, as now, agriculture was dependent on the streams flowing seaward from the Andes. We learned from the American consul at Tacna, in the province still in dispute between Peru and Chile, of the following ancient method still in vogue:

In some of these irrigated districts sunset is the time fixed for transferring the water from one section to another; but in the valley, several hundred feet below the inclosing hills, the instant of sunset occurs earlier at the western rim than in the other end of the valley. After the sun has set in the lowlands it continues for some time to illuminate the snowy slopes above, which glow with ruby light, then suddenly turn milky white and fade into darkness.

To avoid controversy, the ancient Peruvians brought common sense to bear and agreed to consider it sunset at that moment when the sun ceased to illuminate the snow-clad mountain peaks. This method, known as "calculating the sky view," is still in vogue in the province of Tacna.

In Antofagasta we boarded the eastbound train on its way to the Bolivian highlands, changing to the Chilean longitudinal sixty miles inland on the pampa. The longitudinal's beginning is at Pisagua, a port north of Antofagasta. Arica, still farther north in disputed territory, is not yet connected with the Chilean railroad system, being beyond the nitrate zone.

Uninterrupted rail communication from north to south was finally completed eight years ago. In the 1,863 miles of track from Pisagua to Puerto Montt, on the Gulf of Ancud, three different gauges are employed. The government owns most of the road and is gradually taking over the northern section, with its many feeders, controlled by British and Belgian capital and originally built in isolated regions to bring nitrate and other minerals to the coast.

It takes a drab pencil to draw for you a picture of the country crossed those first two days out from Antofagasta. I looked in vain on the monotonous, treeless plain for so much as a cactus plant. We were too far inland to glimpse the restless, blue Pacific, whose tempestuous surf enlivens even the most colorless of the desert ports, while to the east bleak gray hills shut off the snow-crowned Andes.

This stupendous range, whose jagged peaks soar skyward, has created the barren waste by wringing all the moisture out of the trade-winds from the east. Before the Andes rose to their present height, this desert, nearly twice the length of Syria, was a tropical forest.

Just to the north, in Tarapacá, numerous skeletons of gigantic ant-eaters, denizens of the jungle, have been found embedded in the sides of ravines. Chile was an altogether different country when the Andes were young.

CHILE'S CHIEF SOURCE OF REVENUE

Near the railroad I saw deeply furrowed patches of white earth resembling old salt deposits. These mark the site of former nitrate workings. Nitrate of soda, Chile's chief source of revenue, of which the country has virtually a world monopoly, is obtained from the rough rock known locally as *caliche*. It is dug or blasted from the earth, in some places lying near the surface; in others 20 to 30 feet below ground. The nitrate deposits lie from 15 to 90 miles inland from the coast, at an altitude varying from a little over 3,000 to 13,000 feet.

Scientists disagree as to the origin of this valuable mineral. Some claim (and Darwin among them) that it had its origin in seaweed of an ancient period.

One savant argues that the deposit resulted from nitrogen contained in guano. Others believe in its atmospheric origin, advancing the theory that in a remote age

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HAULING WATER IN THE DESERT

This wagon rolls across the northern Chile desert from the distant river. In the Province of Tacna, the territory in dispute between Peru and Chile, a few traverse rivers flow down from the Andes to the sea; then a great stretch of waterless country until the oasis of Copiapó is reached.

Photograph by I. F. Scheeler

YARETA, A CURIOUS PLANT OF THE ANDEAN DESERT

This member of the celery family (*Azarella yareta*) grows in a dry, rocky country, at an altitude of about 15,000 feet. It is green in color, highly resinous, makes an excellent fuel, burns like peat, with little flame and much smoke; gives a fair amount of heat, produces much ash, and throws out flames of many hues. In appearance the plant is altogether unlike its relatives, the celery and the parsnip.

electricity passing through moist air, by combination, formed nitric acid; this in turn, impregnating the flood waters of Andean streams and coming in contact with the limestone of the rocks, formed nitrate of lime; another step in Nature's laboratory brought this nitrate of lime in contact with sulphate of soda, forming the *caliche* we find to-day.

The nitrate fields stretch for several hundred miles along the pampas' western rim, which marks the edge of the ancient flood waters.

THE NITRATE PROCESS IS SIMPLE

The process of production is simple. The loose rock is carried by mule teams, or cars suspended to cables, to the little railways which circulate through the nitrate establishments, and on to the crushing plant, where, after being broken into small pieces, it is thrown into iron vats and boiled until the dissolved saltpeter can be filtered.

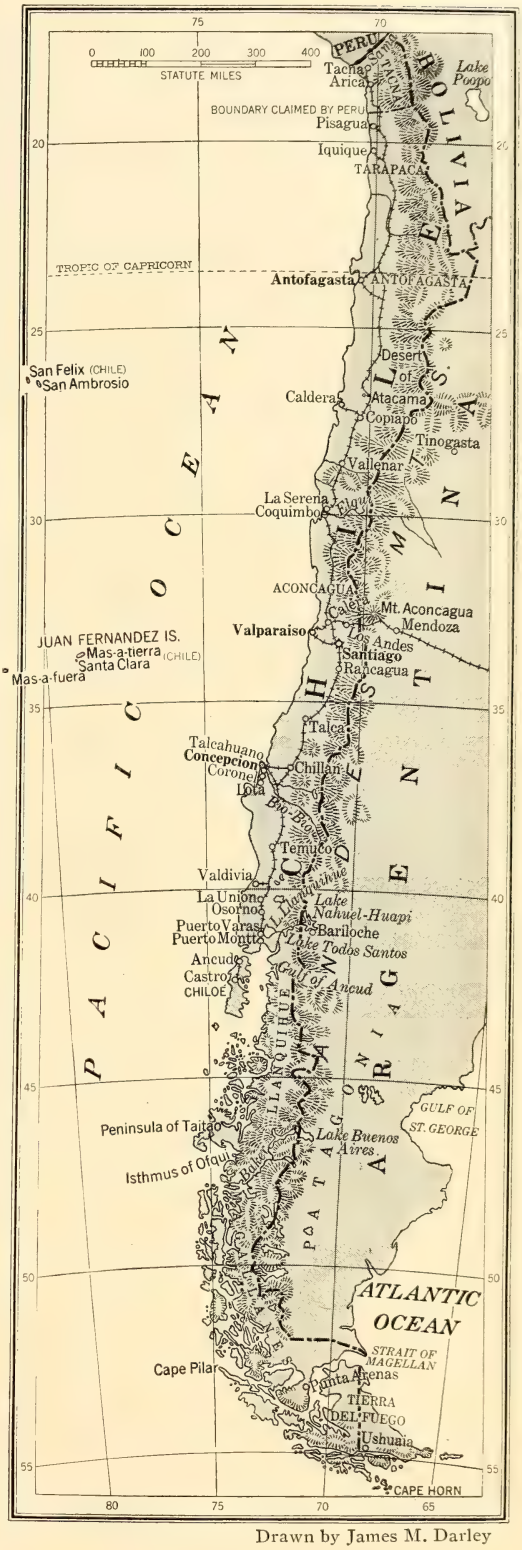
When crystallized it is cleaned, and the finished *salitre*, or nitrate of soda, packed in bags and sent to the nearest port. The greater portion now comes to the United States to enrich our soil and to be used in the manufacture of explosives.

Iodine, precipitated from the nitrate solution, is the most important by-product of the *caliche* rock. By agreement among the nitrate establishments, its production is limited to every sixth year, that the market may not be overstocked.

Operated for the most part by Chilean and British capital, 129 of these nitrate establishments, or *oficinas,* as they are known locally, are scattered over the pampa back of Pisagua, Iquique, and Antofagasta, their tall chimneys dominating the plain. At night, from our southbound train, the myriad twinkling lights of these strange desert towns spoke of life and industry in a region altogether dependent for sustenance on the world of trees and pastures beyond the far horizon.

A LONG JOURNEY "JUST TO SEE RAIN"

At a dreary, sun-baked station, where one ugly galvanized-iron building broke the monotony of the plain, the khaki-clad British manager of one of the nitrate establishments boarded our train. He was going south, he said, "just to see it rain."



Drawn by James M. Darley

A SKETCH MAP OF CHILE

Photograph by R. W. Lohman

THE LITTLE COUSIN OF THE CAMEL

In the Andean region of northernmost Chile, as in the neighboring countries of Peru and Bolivia, llamas are used as beasts of burden. They are highland animals and do not come down to the coast. The trail call of the Indian driver is "Buss-ss-ss."

The eternal blue skies had gotten on his nerves.

"The climate is trying," he told me, "hot during the day, with afternoon dust-storms, and often frost at night."

His particular settlement, with 2,000 or more inhabitants, is a little world in itself, miles from its nearest neighbor. Surrounding the plant are comfortable homes, a hotel, store, hospital, church, post-office, barracks, and a plaza, where the band plays in the evening.

According to authorities, the explored nitrate region contains sufficient mineral to last for 240 years, at the present rate of production.

The nitrate laborers are mostly Chileans, the *rotos*, or workingmen of the country, with a few Bolivians and Peruvians. Chile has always depended for labor on her own peasantry, never importing African slaves or Asiatic coolies, as have other of the Latin American countries.

Alcoholism is slowly but surely sapping the vitality of the Chilean *roto*, long noted for his powerful physique. The Latin American of the educated class drinks temperately, regarding wine as a nourishment rather than a stimulant; but, on my last journey, I noted a growing movement in favor of prohibition throughout Chile, among thinking people who realize the evil result of alcohol on the working classes.

The second night out from Antofagasta we reached Copiapó, where we left the Valparaiso Express to travel thereafter on "local" day trains, stopping off in many Chilean towns all the way down to the Gulf of Ancud.

CHILE'S MOST HISTORIC TOWN

Copiapó is Chile's most historic town. The little stream which borders it, now nearly dry, now in full flood, was our first oasis after crossing the parched desert of Atacama. To travelers of old, as to us, this strip of meadow land was a God-given sight.

To Copiapó, in the fifteenth century, marched the Incan ruler, Tupac Yupan-

Photograph by Richard B. Hoit

NITRATE FIELD ENGINEERS ON A TOUR OF INSPECTION

These fields of northern Chile stretch for several hundred miles along the pampas' western rim. Operated for the most part by Chilean and British capital, 129 of these nitrate establishments, or *oficinas*, as they are known locally, are scattered over the pampa back of Pisagua, Iquique, and Antofagasta. The engineers of one of these establishments are making their rounds in a mule-drawn car furnished with a brake and two good seats, but no springs.

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A DESERT TRAIN WITH IRON WHEELS SUPPLANTING RUBBER TIRES

The Chilean longitudinal railroad does not extend north of Pisagua, but many of the nitrate establishments have their local railways. The American automobile is here supplanting the old mule-team.

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BALES OF JUTE BAGS FROM INDIA FOR THE NITRATE FIELDS

The northern ports of Iquique and Antofagasta are open roadsteads, ships anchoring well offshore.

qui, with his victorious army, to subjugate the tribes of northern Chile.

The Inca's trail from Peru led down the backbone of the snow-clad Andes and across the burning desert. In 1535 Diego de Almagro, a colleague of Pizarro, traveled the same road with a great army of Spaniards and Peruvians, horses and llamas, two Incan princes acting as guides.

Old Spanish chronicles tell of the terrible suffering from cold and thirst endured by Almagro's men on the six months' march. The desert was strewn with their bones. Alluring were Copiapó's meadows to those who survived!

Almagro failed to subdue the southern natives, and five years later a Spanish army was again encamped in Copiapó, led this time by Pedro de Valdivia, who kept on south to found Santiago.

In the halcyon days of '49, when California's gold lured men round the Horn, Valparaiso became the great mart of the Pacific coast, supplying flour and other commodities to the California miners. My pioneer grandfather used to tell me

Photographs by Arthur Madge

IMAGES OF PREHISTORIC DAYS FOUND IN CHILE

The stone figure at the left was unearthed in an underground habitation south of Calama, on the old Incan highway between Cuzco and Copiapó. The costume, splendidly preserved, gives us the dress of a remote period, probably antedating Incan rule. The image at the right is of silver, and was found by a chinchilla hunter on the pampa of northern Chile, not far from the Bolivian frontier. It is three inches in height and represents a woman of the ruling class. The colors of the feather-work and the vicuña wool garments are well preserved.

of those eventful days. When he was in Chile in the early fifties, Copiapó was an important town, sharing the European opera season with Santiago and Valparaiso. Grandfather knew William Wheelwright, the American captain of industry, who in 1851 built the first railroad in South America from the port of Caldera, 50 miles inland to Copiapó.

Wheelwright's dream was of a transcontinental railway across the Andes to Tinogasta, in Argentina, and on to the Atlantic; but the road never got far beyond Copiapó.

THE ROMANTIC STORY OF GODOY, THE SILVER KING

This great American also gave Chile its telegraphic system and, after failing to interest American capital in a steamship line between Valparaiso and New York, turned to England and inaugurated in the early sixties the first steamer service between the west coast and Europe.

In 1832 a donkey driver, Juan Godoy, discovered a silver deposit near Copiapó and put the long-neglected town on the map.

Godoy's story reads like a romance. Tired of loading his train of donkeys with scanty brushwood for town customers, he started across the pampa to hunt the roving guanaco. Sitting on a rock to rest, he discovered that his seat was of silver. Returning home with specimens, he shared the knowledge of his discovery with an educated acquaintance, who aided the ignorant man to make the most of his find. Godoy became the Silver King of that period.

It was hard for us to visualize Copiapó's past splendor in the forlorn little town that we found. Half the buildings were still in ruins, after the disastrous earth-

A NITRATE PLANT OF NORTHERN CHILE

At the side of the plant are big hoppers into which *caliche*, the crude nitrate rock from the pampa, is unloaded. From the hoppers the rock is fed into the crushers, and, after being broken into small pieces, is thrown into iron vats and boiled until the saltpeter can be filtered.

Photographs by Richard B. Hoit

CRYSTALLIZATION VATS, NITRATE PLANT

The hot brine, brought down from the boiling-tanks through the trough in the foreground, is cooled and crystallized in these vats. The nitrate, dug out of the vats a few hours ago, is now draining on the ledge. Most of Chile's nitrate comes to the United States to be used as fertilizer.

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IODINE, A BY-PRODUCT OF NITRATE MANUFACTURE

Precipitated from the nitrate solution, iodine is the most important by-product of the *caliche* rock. By agreement among the nitrate establishments, its production is limited to every sixth year, in order that the market may not be overstocked. These rawhide kegs, filled with iodine, are worth $300 each.

quake of the previous year. The hotel, kept by a sad-faced Englishman, had a decided tilt. Doors and windows were jammed and window-panes missing. Our host apologized for candle-light, saying that the gas-pipes were still out of commission. The stone bathtub, reached by a rickety flight of steps, had a somewhat tipsy appearance.

But the Copiapínos have not lost courage. More than once earthquakes have completely demolished the town. In this land where the extreme infrequence of showers is a hardship, they have come to believe that earthquakes are forerunners of much-needed rain. Between quakes they look to the east, watching for a heavy fall of snow in the Andes. Then the river runs full and the fields smile.

From Copiapó a trail across the desert leads to the mountains, so sterile, gaunt, and forbidding; yet there is a majesty in the Andean contour. From our bleak, upland camp at the sunset hour, the coloring of slopes and crags was gorgeous beyond adjectives to describe. Pink deepened to rose; rose to terra-cotta; terra-cotta to purple. Then each towering peak became a sentinel guarding a mysterious Promised Land beyond the Andes.

We passed the ruins of long-abandoned stone dwellings, occupied, perhaps, in those remote days of pre-Incan rule when these mountains had not risen to their present height and this region was within the corn belt.

HOME OF THE GUANACO, VICUÑA, AND CHINCHILLA

We geographers must think of the Andes, not as a range rising from the coastal plain, but as the most stupendous mountain system in the world, if we con-

Photograph from Harriet Chalmers Adams

AN AMERICAN COPPER MINE IN THE CHILEAN ANDES

If poverty-stricken in verdure, northern Chile is superlatively rich in minerals. Here two rival American mining companies operate gigantic copper properties. A railroad from a port on the Pacific ascends the mountains by way of this canyon, 3,000 feet deep, to the American mine.

sider its gradual slope from ocean bed to crowning summit. Young, as compared with other great ranges, it is still the giant among them.

These heights are the home of the roving guanaco and vicuña, wild cousins of the llama and alpaca, all of cameloid stock. Here soars the mighty condor. A little to the north lies a highland plateau known as the Pampa of the Ostrich, where an occasional rhea, once so abundant on the Argentine plains, still roams.

One afternoon we rode past a natural rock fortress with innumerable windows. At each opening squatted a wise little gray viscacha, gazing out over the plain. A southern naturalist told me of the remarkable habits of these strange rodents.

"In Argentina," he said, "the farmers endeavor to destroy whole colonies of viscachas by filling in the openings to

Photograph from Harriet Chalmers Adams

AN AMERICAN COPPER MINE OF CENTRAL CHILE

It lies high up in the mountains, in the crater of an extinct volcano. In the winter the buildings are deep in snow. By night the flare of electric lights gives a most fantastic appearance to the isolated camp.

their burrows. The task completed, the men ride off, satisfied that the crops in this particular section will no longer be undermined. A mile or more away another viscacha colony receives, in some mysterious manner, an S. O. S. signal, and off the animals scamper to dig out their unfortunate neighbors."

The fleet pampa fox and the velvety chinchilla dispute the borderland between plateau and plain. Near the railroad we passed a chinchilla farm, a new and profitable industry. The area was inclosed by a huge galvanized-iron fence sunk deep in the ground that the valuable animals might not burrow out.

Cattle are driven from Argentina into Chile over the mountain passes, making the journey with their front hoofs shod. Throughout the length of Chile there are many of these Andean passes used by the natives from time immemorial. Through one of these natural defiles a railroad, now building west from Salta, in northwest Argentina, will eventually enter the Chilean nitrate desert, bringing vegetables and fruits now imported from the valleys of the south.

LAND SUPERLATIVELY RICH IN MINERALS

If poverty-stricken in verdure, this region is superlatively rich in minerals.

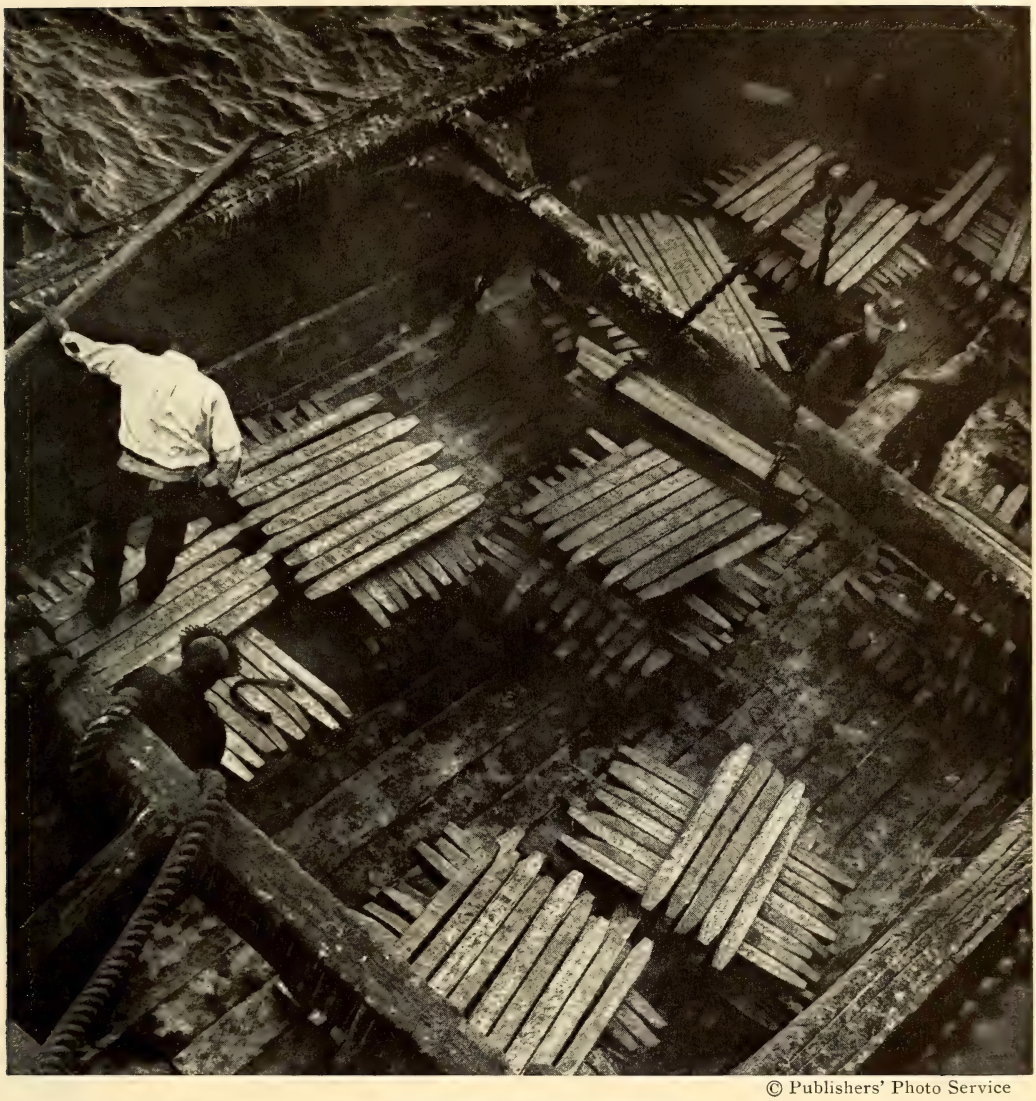
SHEETS OF COPPER READY FOR MELTING

At this big American copper mine in Chile, plates from the electrolytic tanks, where the copper in solution has been plated onto lead "starting plates," are loaded on cars and carried to the furnaces to be melted. This electrolytic method produces the purest copper.

Photographs by Richard B. Hoit

CASTING THE MOLTEN COPPER

A machine-operated ladle pours the metal into four molds. Each mold contains from 175 to 200 pounds of 99.6 per cent pure copper.



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A BARGE-LOAD OF COPPER

One of the copper deposits in northern Chile is said to be the largest of its kind in the world, with the possible exception of a Peruvian copper property not yet thoroughly prospected. Nitrate and copper to-day, and manganese, perhaps, to-morrow, guarantee Chile's economic place in the world's markets.

Metal mining dates back to the days when the Chilean aborigines paid tribute to the Incas in gold and silver. Nitrate and copper to-day and manganese, perhaps, to-morrow guarantee the nation's economic place in the world's markets. Cobalt, nickel, lead, and sulphur are mined.

Two rival American mining companies operate gigantic copper properties. I visited one camp, a transplanted American city with 15,000 inhabitants, where good old U. S. A. jazz resounded by night through the canyon. One of these properties is the largest of its kind in the world, with the possible exception of a Peruvian copper mine not yet thoroughly prospected. By the electrolytic method here employed, the purest copper is produced.

We met a group of engineers and geologists, representing a Japanese syndicate, exploring Chile's undeveloped mineral wealth. They proposed to acquire

Photograph by Publishers' Photo Service

SEA-EELS FOR SALE!

The fishman is offering his catch of cóngrio, a fish which derives its Spanish name from its elongated appearance. It is found in northern Chilean and southern Peruvian waters.

Photograph by Harriet Chalmers Adams

FLOUR FOR THE INTERIOR

In the days of '49 the bread of the California miners was made from Chilean flour. Wheat is raised principally in central Chile, where the long, fertile valley between the mountain ranges is like the golden valley of California. Agriculture represents a high proportion of Chilean industry, one and a quarter million acres being cultivated for wheat.

Photograph by Publishers' Photo Service

THIS FRUIT VENDER'S PACK ANIMAL IS EQUIPPED WITH COWHIDE PANNIERS

After the journey through the northern desert, it is refreshing to reach those irrigated valleys where the finest grapes and melons are grown.

mines and work them on a grand scale with modern methods.

Under the jurisdiction of the Department of Caldera, in which Copiapó is situated, is an isolated Chilean island, 2,000 miles west in the Pacific—Pascua, or Easter Island. It is 1,400 miles from Pitcairn, its nearest inhabited neighbor. The Chileans have a disconcerting way of speaking of this far-away oceanic possession as they would of a near-by province. A meteorological station is located on the island.

With its immense stone terraces and colossal monolithic images, Easter Island is one of the threads in that tangled skein, yet to be unraveled, of prehistoric Pacific migrations. Are these South Pacific isles the top of a submerged continent? Were they the stepping-stones of an ancient Asiatic civilization which migrated eastward to the New World, leaving its imprint on a primitive Americ people.*

The archeological field of northern

* See "The Mystery of Easter Island," in the NATIONAL GEOGRAPHIC MAGAZINE for December, 1921.

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EXPORTING WOLFRAM ORE

Wolfram, the ore from which tungsten is extracted, is also exported from northern Chile. Tungsten is used in the manufacture of tool-steel and for the filament in incandescent lamps.

Chile is merely scratched. Under the drifting sands of the vast Atacama desert lies the record of a pre-Incan race. In the Valparaiso Museum I saw a mummy recently unearthed in the Atacama region. The director told me that it differs from the mummies heretofore discovered on the west coast of South America, being more like the Egyptian type. In a collection in the Chilean capital I saw implements and pottery of this Atacama culture differing widely from archeological remains in Peru and Bolivia.

Continuing south from Copiapó, little by little the desert flora grew from tufts of grass and stunted bush to tall algarobas and cacti of many varieties, one with a great red bloom. At Vallenar we entered a wide, irrigated valley, emerald green with alfalfa, and vines heavy with those luscious white grapes whose equal I have found in no other part of the world.

The vine, brought originally from Spain in colonial days, is now cultivated throughout an extensive range. The French vine, popular in certain provinces,

© Publishers' Photo Service

WHEN THE BIG SHIP COMES INTO HARBOR

When an ocean liner anchors off the port of Coquimbo, rowboats put out from the shore laden with fruit from the fertile valley of the river Elqui. Here the wide, irrigated plain is emerald green with alfalfa and vines heavy with luscious white grapes.

was introduced in the fifties. Chilean wines are celebrated throughout Spanish America. Here the manufacture of wine is regarded as a national industry and few advocates of prohibition place light wine and beer on the black list.

The chief producers market their high-grade brands with a little metal tag attached to each bottle. Each tag bears a number. The restaurant proprietor, when uncorking a bottle, keeps the tag. Every month there is a lottery, and those holding tags with the winning numbers receive cash prizes. Some proprietors turn the tag privilege over to their waiters, who naturally urge the patrons to use the tagged brands.

At the River Elqui the longitudinal railway gives a twist seaward to serve the charmingly situated town of La Serena and Coquimbo, its port.

La Serena, now as tranquil as its name implies, dates back to 1544. In its early history its calm was twice broken by English buccaneers. In visiting its old churches, I was reminded that Chile was devoid of art and industry for two centuries of colonial rule; all church ornaments and books on sacred subjects were brought from Quito, Ecuador.

As you sail down the Pacific coast, you say good-by to verdure at Guayaquil; then follows the long stretch of desert coast through Peru and northern Chile. It is only as you near Coquimbo that green fields again greet you.

For a century and a half Coquimbo has been famed as a mining center. One of our North American steel companies has developed a remarkable iron property in the gigantic Tofo mines, where ore taken from a mountain of iron by steam-shovels

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VALPARAISO FROM THE HARBOR

The chief Pacific port in South America rises like an amphitheater from a crescent shore. It has a population of nearly 200,000. Extensive port works are under construction to protect the waterfront from the inroads of the sea. Valparaiso is the western terminus of the transcontinental railway, which extends 888 miles to Buenos Aires.

is conveyed by an electrically operated railroad to the pier and loaded directly, through chutes, into specially constructed steamers.

HOW THE CHILEANS TRAVEL

From Coquimbo the railroad again strikes inland. Two locomotives urged our train up the steep grade to the *cumbre*, the rack system being used for some 30 miles. Our fellow-passengers on the day train were middle-class Chileans. The élite patronize the express. In Chile, as in other of the South American countries, the middle class has gained strength since my first visit, in 1903.

The aisle was crowded with hand-bags of huge proportions, as very little luggage can be checked free of charge. We heard much grumbling about the terrific increase in fares—75 per cent for passengers and 50 per cent for freight. Since then there has been still another increase. Our car was the average day coach that one sees in the "States"—a little cleaner, perhaps. A placard on the wall gave the date when the car was last disinfected.

Each family carried an enormous lunch-basket, well stocked with cold meats, chicken, bread, fruit, wine, sweets, and other edibles.

The dining-car, used only at meal time in our country, is filled all day long in Chile, the tables being utilized for cards and dominoes. Smoking is permitted in the diner, as well as in the coaches. Our train carried no second-class coach. In the third class were four benches running the length of the car.

"Red caps" to carry luggage and uniformed armed guards for police duty were in evidence at the stations.

We entered a mountainous region where graceful palms covered the hillsides. This is the palm from which the famous *miel de palma* (honey of the palm) is obtained. The tree is not tapped, as in the production of maple sugar, but is felled. The sap obtained is converted into a syrup, in great demand to serve with hot cakes, here known as "panqueques." Featured also on the menu we find two other old acquaintances—"cau-ktailes" and "beef-teackes."

It takes six days of daylight travel from Antofagasta to Calera. Here we meet the lateral railway in the Aconcagua Valley, connecting the town of Los Andes, at the foot of the mountains, with Valparaiso.

The Aconcagua Valley is Chile's gem, a lovely vale where a merry little river, dashing down from crystalline heights, is bordered by velvety green hills. We are now in the rich agricultural region which stretches far south to the Bio-Bio River. This and adjoining valleys, the geologists tell us, are the remains of ancient fjords like those we still see in far southern Chile.

In ages long past, all this country was a maze of fjords and archipelagoes. In the Tertiary period the Sequoia, mammoth of the plant world, to-day represented only by our "Big Trees" of California, grew on these Andean slopes.

Where the coast range of the Andes dips its feet in the sea Valparaiso, South America's chief port on the Pacific, rises like an amphitheater from the crescent shore.

To me this city has never seemed typically South American or even distinctly Chilean. There are so many Britishers and Chileans of British blood here that the place has much in common with British colonial ports. Cochrane and O'Higgins, Simpson and O'Brien, are a few of the many British names in Chile's Hall of Immortals. Ever since the war of independence, men of their blood have here played star rôles. In the late World War thousands of men of British blood left South America to serve in His Majesty's forces.

ELEVATORS CONNECT THE STREETS OF VALPARAISO

Like Hongkong, Valparaiso is formed of a few level streets on land in part reclaimed from the sea, and a residential section on the hills above. Elevators on inclined planes, known locally as "ascensors," connect the streets by the shore with those on the heights.

These lifts are the first objects in the port to claim the traveler's attention and the ones that dwell longest in his memory. They are operated in the open, all day long and far into the night, lifting and lowering thousands. The view from one of these nearly perpendicular inclines, of

LONGSHOREMEN OF VALPARAISO

Noted for his powerful physique, the brawny, bare-legged *roto* shades his head with a white cloth in oriental fashion.

Photographs by Harriet Chalmers Adams

A WOMAN STREET-CAR CONDUCTOR OF VALPARAISO

When, many years ago, the men of Chile went to war, women were first employed as street-car conductors. So efficiently did they fill the position that they were retained after the emergency had passed.

town, harbor, and encircling hills, is not unlike that other wonderful view from the peak above Hongkong.

VALPARAISO IS WAGING A WINNING BATTLE WITH THE SEA

The harbor of Valparaiso is called a bay by courtesy. It is almost an open roadstead. The traveler is impressed with the stupendous work, still in progress, for protecting the shore from the terrific inroads of the sea. At the season of *temporals* the surf dashes in with relentless fury, tearing down the massive masonry of the seawall and devastating the waterfront; but bulwarking against the enemy goes on untiringly and in time the port will win.

A norther sweeping in is a mighty spectacle to behold. I prefer to watch it from the shore.

> We've slipped from Valparaiso,
> With the Norther at our heels.

Well do I remember it! It was just at the beginning of one of these storms. The passage from shore to ship was made in a rowboat. A mountain of undulating water towered on either side of our frail craft, and only miraculously, on the crest of the wave, did we land, at last, limp and drenched, on the heaving ship's deck. The ship could not hold anchor, and it was with a prayer of thanksgiving that we beat toward the south.

I am often asked what interested me most in Chile. Were I a materialist, I might say "the food." In no other part of the globe is food at the leading restaurants better than in the south temperate cities of Valparaiso, Santiago, Buenos Aires, and Montevideo.

Valparaiso's market is stocked with excellent meat—beef from Argentina, fattened in Chile; veal from Tierra del Fuego; sea food from cold southern waters; fresh-water fish from snow-fed streams; dairy products from the southern German colony; vegetables from central Chilean valleys. With tropical fruit from Ecuador, native wine of the best quality, delicious sweets in the form of fruit and sugar paste, augmented by almost any imported delicacy you may desire, I dare not recommend certain of these restaurants to friends of increasing girth.

Photograph by Harriet Chalmers Adams

A NEWSBOY OF VALPARAISO

Unlike Buenos Aires, where many of the newsboys are of Italian blood, the Chilean urchin is distinctly *Chileno*. The first daily newspaper in the country, *El Mecurio*, was established in Valparaiso in 1827. It exists today. There are now 550 publications in Chile.

Chilean sea food, known as *mariscos*, deserves special mention. Mussels and oysters come from beds off the island of Chiloé and lobsters, of unusual size, from the islands of Juan Fernandez.

ROBINSON CRUSOE'S ISLE FAMOUS FOR ITS LOBSTERS

Más-á-Tierra, the largest of the Juan Fernandez group of three islands, lying 360 miles southwest of Valparaiso, is Robinson Crusoe's isle. It was here, in 1704, that Alexander Selkirk, a Scottish

Photograph by Richard B. Hoit

CAKE-SELLERS AT A RAILROAD STATION IN CENTRAL CHILE

sailor, was dropped ashore from an English galley at his own request. If we are to believe his biographers, it was a clear case of "Mr. Captain, stop the ship; I want to get off and walk." Selkirk had dreamed of shipwreck and yearned for *terra firma*.

Defoe, in writing his famous story, made the West Indian island of Tobago the setting for his hero's adventures, instead of the Chilean island, where Selkirk lived for more than four years.

Besides Selkirk and the lobsters-of-renown Juan Fernandez has its unique chonta palms, now becoming rare, and other semi-tropic flora. Before the axe of thoughtless man felled many of the great trees, there was a forest of sandalwood, far removed from its native habitat.

Valparaiso must have been lively in 1849, when my pioneer forefathers were trailing to California across the plains and round the Horn. It was then the emporium of trade with the newly opened gold-fields and a free port, where ships could bring in goods to be held in bond, paying only a small duty on transshipment. The bread of the California miners was made from Chilean flour.

The situation of Santiago, Chile's capital, nearly 1,800 feet above the sea, is most attractive, ranking in beauty among South American cities second only after Rio de Janeiro and mating La Paz, Arequipa, and Caracas.

SANTIAGO'S SUBLIME PANORAMA

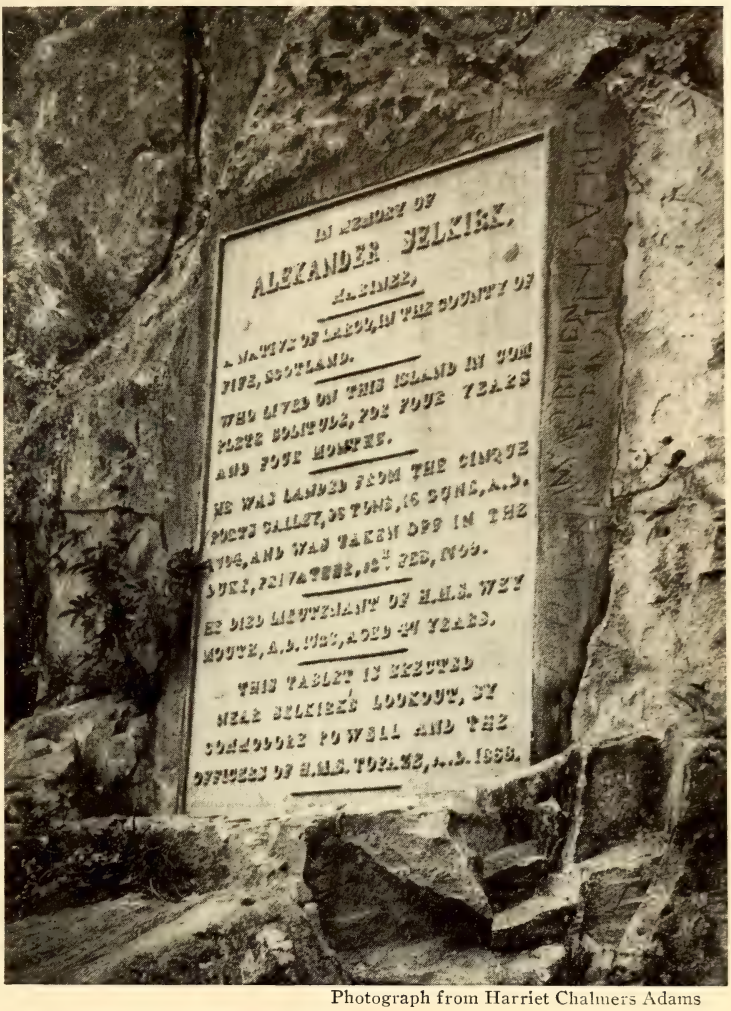
Come with me at the sunset hour to the summit of Santa Lucia, that singular hill of volcanic origin in the heart of the city, where Pedro de Valdivia, the real conquerer of Chile, built his first defense against the natives. This once barren knoll, 400 feet above the plain, has been transformed into a hanging garden. Over its tree-tops we look down on the great city of half a million souls—a city of low buildings and checker-board streets set in emerald meadows and encompassed by snowy mountains. Only at our own Mount Rainier have I seen flower-spangled fields and snow-draped crests in such close proximity.

Now, as the sun sets, the jagged Andean peaks, towering above purpling slopes, are aflame. It is a sublime panorama.

In this part of Chile are many mountains whose summits can be won by Alpine enthusiasts. The view of green fields, blue ocean, and surrounding ranges from one of these crests is worth the most strenuous climb.

Californian poppies blowing in the breeze,
Arching blue of heavens, curving blue of seas,
Line on line of mountains, rising crest on crest,
Steeped in golden sunshine, Chile at its best.

Mount Aconcagua, the highest peak in the Americas, just across the line in Argentina, wears its eternal snow-helmet. Aviators crossing the Andes fly past the volcano Tupungato. Up to the time of my writing, eight bird-men and one bird-woman have successfully dared the Transandine flight. Five were Chilean, two French, one Argentine, one Italian. There have been a number of unsuccessful attempts and two of the aviators lost their lives.


IN MEMORY OF
ALEXANDER SELKIRK,
A NATIVE OF LARGO, IN THE COUNTY OF
FIFE, SCOTLAND.
WHO LIVED ON THIS ISLAND IN SOLE
SOLITUDE, FOR FOUR YEARS
AND FOUR MONTHS.
HE WAS LANDED FROM THE CINQUE
PORTS GALLEY, 30 TONS, 16 GUNS, A.D.
1704, AND WAS TAKEN OFF IN THE
SOLE, PRIVATEER, 90 TONS, 12 GUNS.
BY DISD LIEUTENANT OF H.M.S. WEY
MOUTH, A.D. 1711, AGED 49 YEARS.
THIS TABLET IS ERECTED
NEAR SELKIRK'S LOOKOUT, BY
COMMODORE POWELL AND THE
OFFICERS OF H.M.S. TOPAZE, A.D. 1868.

Photograph from Harriet Chalmers Adams

IN MEMORY OF ROBINSON CRUSOE

This memorial slab to Alexander Selkirk, immortalized as Robinson Crusoe, is on the largest of the Juan Fernandez group of islands, lying 260 miles southwest of Valparaiso. Here, in 1704, Selkirk, a Scottish sailor, was dropped ashore, at his own request, from an English galley.

Since this is the story of my journey through Chile from tip to tip, we cannot linger in the capital, but must entrain again at Santiago, once more headed south on the longitudinal.

We are now in the long agricultural valley between the Coast Range and the Andes. Wheat-fields and vineyards border the track. Stately rows of Lombardy poplars and eucalyptus inclose the fields.

At the stations are female fruit-sellers uniformed in white. They have melons for sale—big yellow melons—which, like the grapes, take first rank. Last year a consignment of Chilean fruit—melons, peaches, apples, and grapes—arrived in the port of New York. Some of the melons, weighing seventeen pounds, sold for six dollars each. At the same time, Chile was importing oranges and lemons from California. Ripe olives, for which California is noted, have long been a product of Chile.

We pass Rancagua, a famous battle-ground in the war of independence, to-day the junction with a branch railway leading to a big North American copper property high up in the mountains. Now come the industrial towns of Talca and Chillan, with many one-story buildings.

Photograph from Harriet Chalmers Adams

SANTIAGO, AT THE FOOT OF THE ANDES

Few cities rival Santiago in beauty of situation—at the foot of the snow-crowned Andes, encompassed by emerald-green fields. This picture was made from the summit of Santa Lucia, that unique hill-park in the center of the city, where Pedro de Valdivia, conqueror of Chile, who founded Santiago on February 12, 1541, set up his first camp. Santiago has a population of more than half a million.

Photograph by Richard B. Hoit

VIEW OF SAN CRISTOBAL HILL AND THE ANDES FROM SANTA LUCIA, SANTIAGO

From a summit in the center of the Chilean capital we look toward the Cerro San Cristobal, surmounted by a statue of the Virgin. The Harvard College Observatory is situated on this hill. Beyond rise the Andes.

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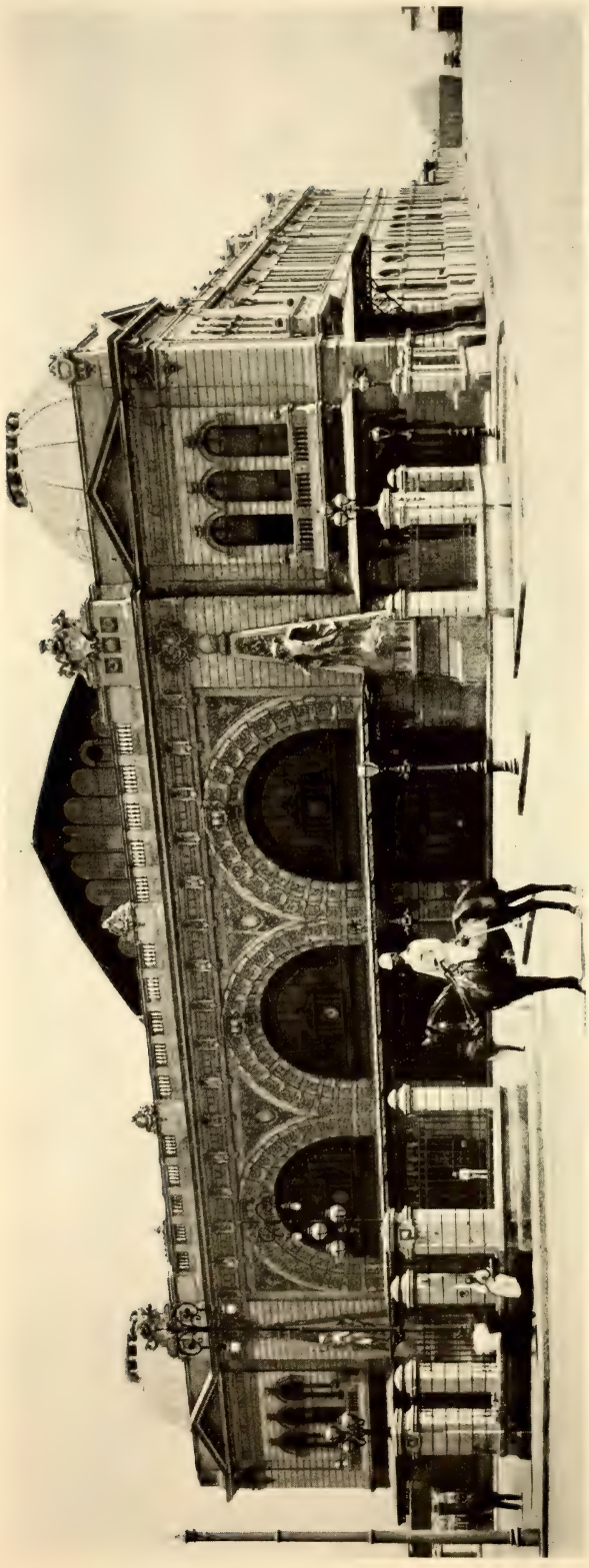
THE CHILEAN WHITE HOUSE, SANTIAGO

This palace, once the home of the national mint and still known as the Palacio de la Moneda, "La Moneda," is now the official residence of the President. Here also are the offices of the Departments of the Interior, Foreign Relations, Finance, and of Justice and Public Instruction. The building was begun in 1786 and completed in 1805.

Photograph from Armando Peró

HOME OF THE CHILEAN CONGRESS: THE CAPITOL BUILDING, SANTIAGO



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MAPOCHO RAILROAD STATION, SANTIAGO

It takes its name from the river Mapocho, which flows through the city. Here the passenger from Valparaiso or Los Andes detrains.

Industrial growth is slow but certain. Besides possessing raw material for manufacturing, Chile has unlimited water-power in the Andes for hydro-electric development.

THE CHILEAN COWBOY'S GAME OF "TOPIO"

From Chillan we drove to a neighboring village to watch the country-folk at play. The Chilean cowboy is less picturesque than his fellow on the other side of the Andes, the Argentine *gaucho*. His trousers are not as baggy and he is not as gaily bedecked with silver trappings. He is known as the *huaso*, which means "countryman," while the little country maid is the *huasita*. He is a splendid horseman, and his steed is high-spirited, with an Arab strain. His favorite sport is shared by his equine friend. We saw the ancient game of *topio*.

In front of a farmhouse, under the shade trees, were large, solidly built uprights with cross-bars. These elongated hitching-posts play an important rôle in topio.

The horsemen pair by lot and "line up" in front of the bar. One of the riders presses his horse forward against the bar, crossing and imprisoning the head of his opponent's mount. At the referee's call the game is on, and the rider of the imprisoned horse endeavors to free him.

The horses are as highly trained as our polo ponies, and, when matched with skillful riders, a single struggle may last an hour. In the preliminaries a dozen such contests are simultaneous, with short rests be-

tween. A day is often consumed in determining the final victor.

There is no more exciting sport for riders, horses, and spectators than a good topio match.

The Chileans have never cared for bull-fights or cock-fights, favorite sports with others of Spanish blood. Among transplanted sports, the educated class has taken to football, tennis, and polo, but is not enthusiastic over golf or baseball. The national dance, the *cueca,* once popular throughout the country, is still in vogue in many of the villages.

We sped southward through the irrigated bottom lands of central Chile, with their refreshing alfalfa fields, their browsing cattle. It is a country of large estates, where the *roto* toils for the master—the ancient feudal system.

CONCEPCIÓN, CHILE'S THIRD CITY.

Few foreigners stop between Santiago and Concepción, a day or a night journey on the express. Concepción, Chile's third city in importance, is on the north shore of the Bio-Bio River, not far from the sea.

The Bio-Bio, the largest river on the west coast of South America, was long the dividing line between civilized Spanish Chile and the territory of the indomitable Araucanian Indians, who for more than three centuries defied their country's invaders. As a frontier post and the seat of innumerable earthquakes, Concepción has known turbulent days.

Nine miles from Concepción lies its seaport, Talcahuano, with the best harbor in southern Chile. It is the seat of the whaling industry, whales being found nearer the shore here than in most parts of the world.

Southward lie the ports of Coronel and Lota, where vast coal mines extend under the sea. Although Chile is the principal coal-producing country of South America, with an estimated coal reserve of two billion tons, only one and a half million tons were produced last season, great quantities of coal being imported from the United States, Great Britain and Australia and fuel oil from Mexico.

When we crossed the Bio-Bio River we entered that romantic territory known to the Chileans as the *Frontera.* Within the memory of the living, white men might not enter this region of great forests and noble rivers. It was the domain of the Araucanians.

We dropped off in Temuco, to study and photograph this once strongest and most valorous of all South American tribes, for centuries unconquered by Inca, Spaniard, or Chilean. It was left to evil old John Barleycorn at last to batter down their splendid resistance.

Nowadays the Indians and Chilean peons cannot get their drink too strong. They mix the native *aji,* a very hot pepper, with crude brandy to give it sufficient "pep."

There are about 100,000 Araucanians left in southern Chile. They call themselves *Mapuche,* which means "people of the country." They live in no particular place, being scattered through the forest from the ocean to the Andes; but there are more of them around the town of Temuco than in any other section. Here they farm on a small scale, raising wheat, corn, potatoes, and apples; some raise cattle. In the mountains to the east they raise cattle and sheep.

Formerly these Indians had a much wider range, extending across the Andes toward the Atlantic. Some of their relatives, now differing widely in customs, still live on the Argentine side of the mountains.

The Incas of Peru failed to subjugate these people and gave them the name of Araucanians, derived from the Quichua word *aucca,* meaning rebel; but vestiges of Peruvian culture somehow drifted down to them. From the Incas they learned the art of weaving, and woolen blankets replaced the old guanaco-skin garments.

The guanaco, now found on the Patagonian plains east of the Andes, still strays occasionally, through some low-lying mountain pass, into Chilean territory.

The black and white designs on modern Mapuche ponchos remind me of certain ancient Central American designs. The mass of silver ornaments still worn by Mapuche women show Incan influence—the silver figures of llamas and the silver pins fastening the blanket across the woman's breast (the tupu of the Incas).

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PLAZA DE ARMAS AND THE CATHEDRAL, SANTIAGO

In colonial days this beautiful park was known as the Plaza Mayor, and the chief government buildings surrounded it. The cathedral, facing the square, stands on the site of the temple erected by Pedro de Valdivia, the founder of Santiago.

© Publishers' Photo Service

FLOWER-SELLERS OF THE ALAMEDA: SANTIAGO

Like California, Chile is a land of flowers. The flower booths on the Alameda, or Avenida de las Delicias, remind the traveler of similar ones on the Rambla, in Barcelona.

© Publishers' Photo Service

INTERIOR OF THE NATIONAL ART MUSEUM: SANTIAGO

The Palacio de Bellas Artes contains, besides a museum, a school of fine arts. On the ground floor may be seen the works of many Chilean sculptors, while the galleries surrounding the main salon contain paintings by the nation's most famous artists as well as those of the old masters.

The cross, featured in Mapuche ornaments, erected over graves, and painted on the faces of warriors during festivals, is not, curiously enough, the Christian cross introduced by the Spaniards. It is the eight-pointed Maltese cross and antedates the European invasion.

COSTUMES AND CUSTOMS OF THE MAPUCHE

Incan influence can also be noted in certain Mapuche words. A species of seaweed, for instance, here much prized as food, is known as *cuchayuyu*. To the Incas it was *cocha yuyu,* "garden truck of the sea." I compiled quite a list of these Incan-Mapuche words.

The women cling to the old type of costume—the black or deep indigo-blue belted blanket gown, pinned over the shoulders. They wear their abundant black hair in two long queues, wrapping a cloth about the head, turban-fashion. Their enormous silver ear-pendants and massive necklaces give them a bizarre appearance.

The barbarous fashion of plucking the eyebrows, popular of late in the United States, has long been practiced by Mapuche belles.

© Publishers' Photo Service

A CORNER OF THE MARKET: SANTIAGO

Chilean melons are unrivaled. Last season, fruit from Chile was marketed in New York, some of the melons, weighing seventeen pounds, selling for $6 each.

The men have forsaken native dress save back in the mountains, where a few still cling to the *chirapa,* or bloomers, evolved from a blanket wrapped round the legs and tucked through the belt, the same type of trousers formerly worn by the Argentine *gaucho.*

Mapuche customs, slowly dying out, are interesting. There is the hair-pulling contest among the boys. Standing face to face, each combatant grasps the long locks of his opponent and the game is on. The feat is to destroy your opponent's balance and bring him to the ground. Once down, there is no pommeling. The hold is loosened and the boys stand up and begin again. *Chueca,* the national Mapuche ball-game, played with clubs, is not unlike hockey.

Certain names among Christianized Mapuches and Chileans puzzle the traveler until he learns that, regardless of sex, a child is often named after the saint upon whose day it happens to be born. Thus a man may be called "Maria" and a woman "Pabla."

Photograph by Publishers' Photo Service

THE MASCOT OF THE REGIMENT

Condors are seldom tamed. Their home is in the azure above the towering Andes and on the highland crags. In this century the airplane crossing the Andes disputes the condor's domain.

Some of the Mapuche girls I met had names half Christian, half pagan, like little Maria Epuqui, who went to all the trouble of changing her gown on the sidewalk to have her picture taken. Her best clothes and shoes were in a bundle under her arm.

There are Catholic and Protestant missions among these Indians. The British missionary, who has lived here for twenty years, rides back into the wilderness and camps with his flock. "They are eager to learn Spanish," he told me, "better to cope with the Chileans and retain their allotted lands."

ARAUCANIAN BLOOD IN CHILEAN VEINS

The tragic history of this valiant forest tribe is told in "La Araucana," that epic of Ercilla's, the Spanish warrior-poet, who met these Indians on the battlefield in sixteenth-century wars. His mighty heroes, Caupolican and Lautaro, were real men. The one was put to

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SOLDIERS AT SCHOOL

Military service is obligatory in Chile, a call being made on all males of twenty years. The strength of the active army is estimated at about 20,000; war strength, 300,000.

death by the Spaniards; the other caused the death of the Spanish conqueror, Pedro de Valdivia.

In the blood of the southern Chileans, save among a few aristocratic Spanish families, flows the strain of conqueror and conquered. The great round eyes of Chilean children, the features of the universally beautiful women, show Mapuche blood. As a pure-blooded stock, these Indians are doomed; but here there will be absorption rather than annihilation, and the splendid physique and valorous traits of this native people will not be lost to posterity.

In Hopi-Land, in Arizona, the Indians hold their annual prayer festival for rain. In Mapuche-Land they also have a traditional prayer feast; but here they pray for dry weather. The season of our visit there had been scarcely two consecutive rainless lays. We were under the weeping skies of Arauco.

In northern Chile they long for rain; in southern Chile, for sunshine. In the nitrate zone the total rainfall during the past twenty years has barely totaled one inch. For fourteen years not a drop fell. In Copiapó, 500 miles from the beginning of the Chilean desert, there is an average annual fall of three-quarters of an inch.

But if the north has "gone dry," the south is certainly wet. Here Jupiter Pluvius reigns. Vapor-laden winds from the Pacific meet winter-chilled earth. The winds, ascending the Andes, pass through Nature's wringer and are hurled back in torrents. Annual precipitation must be gauged in feet instead of inches. Sixteen feet, even eighteen feet, farther south, is the official record.

Our winter is the Chilean summer. If you plan a visit to rainiest Chile, go in December or January. Then the roads are in better condition.

WOODEN CLOGS REPLACE RUBBERS

Saddle travel is popular. Ox-teams drag carts over the muddiest of roads. The carts have wooden wheels, like the chariots of the Romans, and their creaking is heard from afar. In more settled regions, corduroy roads have been con-

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GROWING HEMP IN THE ACONCAGUA VALLEY

While not one of the leading products, hemp is successfully grown in Chile. Last season 2,700 tons of hemp fiber were produced and an equal amount of seed. This seed is a favorite food for poultry and cage-birds. In 1832 the Chilean Government offered, as an inducement to all who would plant hemp, an exemption from taxation for ten years.

structed; but the roads on the frontier are so bad for many months of the year that an American friend of mine, whose husband has a cattle ranch and lumber camp in the mountains, is actually marooned during the long wet season. Because of the mud, people south of the Bio-Bio wear wooden clogs over their boots, as we wear rubbers.

But rain or no rain, mud or no mud, the traveler who fails to visit southern Chile misses one of the New World wonderlands. There is an almost continuous forest from the Bio-Bio to the "jumping-off place" at Puerto Montt. In this forest are many lakes and clear grass-bordered rivers. Lumbering is the important industry. Sawed timber is piled high at the railroad stations.

In the days when Darwin voyaged to Chile, pine boards passed for currency in the southern ports. The Indians brought

Photograph from Harriet Chalmers Adams

A CHILEAN RANCHER IS A KING IN HIS OWN DOMAIN

His great country-house, where scores of town guests are often entertained at week-ends, is set in the shade of Lombardy poplars, well back from the road.

them out on their backs from the depths of the dripping forest.

Of Chilean trees, I like best the Araucaria pine, with its tall, branchless trunk and umbrella-like top. It has a relative in Brazil and Paraguay. The Mapuches gather the seeds from its cones.

"Why do you import so much Douglas fir from America, when you have such splendid forests?" I asked a Chilean fellow-traveler. He launched into a discourse on the wonders of the Chilean forest.

"We *do* produce lumber," he said, "lots of it, almost half of what is used in the country. That pile we just passed was 'lingue,' used for furniture. Those gigantic pines are 'alerce.' Some grow 120 feet high and 15 feet in diameter. It's about the largest pine in the Americas! . . . That big tree is the 'coihue.' Its wood can be used for paper-making, and there are millions of them in the forest."

The *copihue,* national flower of Chile, glorifies the woods. It is the bell-shaped bloom of a vine which festoons the trees—

Photograph by Harriet Chalmers Adams

SELLING CHILE'S NATIONAL FLOWER

The copihue is the bell-shaped bloom of a vine which festoons the southern woods—red-rose, rose, pink, and white in color. A famous horticulturist has said: "All in all, the copihue is the most beautiful flower which the earth has produced." The Bureau of Plant Industry, U. S. Department of Agriculture, is now raising the copihue, and before many years this lovely flower will be known throughout the country.

red-rose, rose, pink, and white in color. Boys and girls gather great armfuls of these lovely flowers and sell them at the railroad stations.

THE LAND OF WILD BERRIES

This is the land of wild berries. Here the strawberry is native. In 1715 a Frenchman carried the first Chilean strawberries to Marseilles and cultivation in Europe began. Later this berry, superior to our variety, was brought to the United States. Blackberries grow so luxuriantly that they are considered a pest.

"You brought them to us from North America," a Chilean acquaintance told me, "but we'll have to forgive you, because you gave us, also, the California quail."

I had not expected to find quail here, or flocks of shimmering parrots, so far south. Back in the woodland depths hides the mysterious *huemul*, the shy, diminutive Chilean deer. Wild cattle roam the highland gorges of these southern Andes.

THE GERMAN COLONISTS IN SOUTHERN CHILE

We revisited a number of prosperous South Chilean German colonies which we had known in former years. The first of these colonists, eight families in all, arrived in the port of Valdivia in 1846. There are now about 30,000 people of German stock in the country, mostly between Valdivia and Puerto Montt.

The towns of La Unión and Osorno show marked German influence, while Puerto Varas, on the shore of lovely Lake Llanquihue, is a typical Teuton village. I passed many groups of tow-headed school-children with knapsacks on their backs.

These people have greater solidarity than any other foreign racial group. Their Chileanization seems to consist of learning Spanish and wearing the poncho in place of the mackintosh. Their children are taught to revere the fatherland.

As dairymen, fruit-growers, and lumbermen, these colonists are most successful. Almost every family takes summer boarders. Each place has its waddling geese, its cool, trellised beer-garden.

The Krupp concession in southern Chile, much talked of last year, is not materializing. This concession, granted two individuals on behalf of the Krupp Company, gave them the right for 30 years—the lease renewable at the expiration of that time—to 346,000 acres of forest land, with underlying coal-beds. A branch of the Krupp iron and steel industry was to have been established. Previous water-

rights granted Chileans, and other legal knots, seem to have blighted the scheme.

IN THE NEW WORLD SWITZERLAND

At Puerto Varas we left the railway for a side trip, via the lake route, across the southern Andes. This is one of the loveliest regions I have ever visited. The Chileans call it the New World Switzerland. There is a chain of four lakes, two on either side of the continental divide, with wooded stretches between.

The first lake, Llanquihue (a Mapuche name), is an ultra-marine sheet of water, with forest-encircled shores. From Puerto Varas we steamed across the lake toward Mount Osorno. Osorno is one of the noblest mountains in the entire Andean range — isolated, conical, snow-draped, not unlike Nippon's sacred Fuji.

The journey from Lake Llanquihue to the second lake, Todos los Santos (All Saints), is made by automobile during the summer; by coach when the roads are very muddy. We made it in the saddle, always our favorite mode of transportation, through enchanting woods, now rich in nuts and wild berries, across grassy flower-strewn fields, beside the merry little Petrohué River.

Lake Todos los Santos is just at Mount Osorno's feet, emerald green, with heavily wooded shores showing few habitations. A second boat ride of several hours brought us, at the end of the first day's journey, to the Swiss inn at Peulla.

The second day's journey is over the Andean pass, here only 3,445 feet above sea-level, to little Lake Frias, in Argentina, and on to big Lake Nahuel-Huapi.

From the town of San Carlos de Bariloche, on the shore of the last-named lake, the journey can be continued by automobile and rail to Buenos Aires. Many Argentines and Chileans cross the continent by this route in the summer time.

The Argentine lake region has already been made a national park, and in time the Chilean side will be improved with metaled highways, so that automobiles may be used all the year round. No other transcontinental route south of Peru can boast of such magnificent scenery.

Returning to Puerto Varas, we continued on to Puerto Montt, on the Gulf of Ancud, where the longitudinal railway ends. The only Chilean railroads south of this point are the line which connects the towns of Ancud and Castro, on the Island of Chiloé, and a privately owned stretch of rail near Punta Arenas.

Photograph by Harriet Chalmers Adams

WOODEN CLOGS IN PLACE OF RUBBERS

Southern Chile is one of the rainiest sections of the world. On the muddy roads wooden clogs are worn over the shoes in place of rubbers. This little fellow is selling overshoes at the railroad station in Temuco.

ANCUD SEAT OF A SHELL-FISH INDUSTRY

Backed by evergreen hills, facing a crescent shore, lies the pretty little town of Puerto Montt, a busy port of southern Chile. From here steamers sail through the inland passage, that maze of archipelagoes, to the Strait of Magellan and

Photograph by Publishers' Photo Service

MAKING ROPE FROM HEMP FIBER

The hemp fiber from which the rope is made is obtained from the inner bark of the stalk.

© Publishers' Photo Service

A PRIMITIVE ROPE-WALK IN LOS ANDES

Photograph by Harriet Chalmers Adams

IN FROM THE COUNTRY

The town of Temuco is in the heart of the Araucanian region. Here the roads are muddy most of the year, owing to the excessive rainfall, and ox-cart travel is the chief mode of transportation. These Indians raise wheat, corn, potatoes, and apples. Their fellows in the mountains to the east raise cattle and sheep. The men have adopted the Chilean costume, but the women cling to the dress of their grandmothers.

into the innumerable fjords that here cleave the ragged mainland. We boarded a decidedly ill-kept little boat bound for Ancud, on the Island of Chiloé.

Ancud, a galvanized-iron town fairly reeking of the sea, is the seat of the shellfish industry. Here clams, mussels, and shrimps are canned for export and oysters-in-the-shell shipped to Valparaiso.

Wheat and fruit do not thrive in this moist climate, but potatoes form an important article of export, 200,000 sacks being shipped the season of our visit. I found Chiloé's autumn climate very damp.

Here I ate my first supper of cooked seaweed, which is not unpalatable. I was interested in the little Chilote pony, wiry, with great endurance, years of isolation having here developed a peculiar equine type.

CHILE'S UNEXPLORED REGIONS

It is five hours by rail from Ancud to Castro, the last Chilean town of any importance until Punta Arenas is reached.

The unexplored portion of Chile lies along the Andean range, in the provinces of Llanquihue and Magallanes. In 1783 a Spanish priest, Fray Francisco Menendez, explored and mapped a great portion of the wild region east and southeast of the Island of Chiloé. His long-neglected diary was some years ago published in Chile, and modern explorers found they had followed the intrepid friar's century-old trail. I have a copy of this fascinating diary.

Last year an Argentine expedition, accompanied by several eminent Chilean scientists, explored the unknown region lying between latitudes 46° and 47°. An exhaustive study was made of glaciers and flora on the Isthmus of Ofqui. Lake Buenos Aires, one of a long chain of lakes on this southern borderland, surpasses in size all other South American lakes save Titicaca.

The Chilean Government is considering the cutting of a canal through the Peninsula of Taitao, which will save steamers

Photograph by Harriet Chalmers Adams

AN ARAUCANIAN MOTHER

These women have powerful physiques and strong features, reminding one of the Maoris. After their children, massive silver ornaments, such as this woman displays, are their dearest possessions. They sometimes pawn, but seldom sell, these treasures.

bound along the inland waterway from navigating the open sea. South of Taitao the scenery changes. The islands terminate in abrupt cliffs and glaciers come to the sea. Even at this great distance from the Equator, the trees are evergreen and the temperature rarely falls below zero.

AT THE STRAIT OF MAGELLAN

We came, at last, in our voyaging to that winding, river-like channel, that cleft in the Andes which the great Portuguese navigator, in the service of Spain, discovered in 1520. To the north lay the South American mainland; to the south the Fuegian archipelago. I see still those majestic cliffs shading from gray into violet; those mysterious glaciers slipping into a leaden sea; those storm-petrels winging their way overhead!

These western reaches of the Strait of Magellan are treacherous. The Pacific is misnamed. Mariners usually find a gale off Cape Pilar. Punta Arenas has been the goal of many a missing ship.

If you will consult the map (see page 223), you will see that practically all but one of the islands south of the Strait belong to Chile. The largest island of the group is divided between Chile and Argentina.

PUNTA ARENAS PROSPERITY BASED ON SHEEP

The Chilean city of Punta Arenas, on the mainland facing the Strait, is the metropolis of this region; but the Argentine town of Ushuaia, in Tierra del Fuego, is the southernmost permanent settlement in the world.

From Cape Pilar to Punta Arenas we looked on a virgin country—huge masses of rock, a land suited neither to agriculturist nor shepherd; but from Punta Arenas on to the Chilean boundary, both sides of the Strait are well adapted to agriculture.

For its population, which is about 24,000, Punta Arenas is the most commercially successful of all Chilean cities. It owes its recent prosperity to the growth of the sheep industry. Exports to the

United States last season totaled $12,000,000. There was also a considerable export of frozen mutton to Great Britain.

The earliest navigators passed this point, and Sarmiento's band, settling here in the sixteenth century, died of starvation. On the site of old Port Famine the Chilean flag was planted in 1843. Yankee sailors and whalers dubbed the forlorn penal colony "Sandy Point" (Punta Arenas), and the name survived.

In the sixties the first steamship line between Valparaiso and Liverpool was inaugurated, and Punta Arenas, the most isolated port in South America, came into importance. It is 1,100 miles from Bahia Blanca, the nearest big port on the Atlantic, and 1,200 miles from Talcahuano, on the west coast.

Photograph from Harriet Chalmers Adams

ONE OF A PASSING RACE

During the last years of the nineteenth century and the first fifteen years of this century, the Fuegian Indians, of three different tribes, steadily decreased and are now practically exterminated. This is an Ona woman, weaver of baskets. Tuberculosis and kindred ills of civilization, along with the sheepherder's deadly rifle, put an end to her tribe (see text, page 273).

At the time of our first visit, in 1904, Punta Arenas was an unpretentious little town of galvanized-iron roofs. I was struck with the total lack of verdure; the terrific wind-with-an-evil-twist, which threatened to blow one across the Strait, right on down to Cape Horn.

Whenever the bell at the end of the long pier tolled, there was great excitement. It heralded the coming of a steamer. Out rushed the cosmopolitan inhabitants of this "tail-end" city, eager for news from home.

Telegraph and wireless finally brought this region, so long cut off by sea and impassable tracts of uncultivated country, in touch with the rest of Chile.

The Panama Canal struck Punta Arenas a hard blow. Trade was diverted. But, in spite of its waning importance as a port of call, the city continued to thrive.

AN IMPORTANT FUR MARKET

Turning its eyes from sea to earth, it grew to value its surrounding grazing lands. Sheep ranches multiplied. Motor roads stretched out toward the Argentine pampa; a steadily increasing fleet of small vessels sailed into the Fuegian channels.

THE ANCIENT GAME OF TOPIO, POPULAR IN CENTRAL CHILE (SEE TEXT, PAGE 248)

Photographs from Harriet Chalmers Adams

AN ARAUCANIAN GRAVEYARD

The wooden images, crowned with tall hats, remind one of those mammoth head-covered stone images found on Easter Island.

Photograph from Harriet Chalmers Adams

AN ARAUCANIAN HOME, SOUTHERN CHILE

There remain 100,000 Araucanian Indians in Chile, the most valorous of all South American aborigines, for centuries unconquered by Inca, Spaniard, or Chilean. They call themselves "Mapuche," which means "people of the country." The Mapuche learned weaving from the Incas of Peru, who tried to conquer them. Prior to that period they wore guanaco-skin garments (see text, page 249).

Photograph from Harriet Chalmers Adams

PUERTO VARAS, A GERMAN SETTLEMENT ON LAKE LLANQUIHUE

This is one of a number of thriving German settlements of southern Chile. Across the lake rises Mount Osorno, rival in beauty of Nippon's sacred Fuji. This snow-clad monarch rises from the second of a chain of lakes extending across to Argentina.

Photograph from Harriet Chalmers Adams

THE STRAIT OF MAGELLAN

On one shore, the end of the South American mainland; on the other, little-known Tierra del Fuego, whose unique pasture-lands support 2,000,000 heavily fleeced sheep. The western entrance to this channel has been the grave of many mariners, so treacherous are its waters.

Photograph by Harriet Chalmers Adams

SCHOOLBOYS OF OSORNO, IN THE HEART OF A GERMAN COLONY OF CHILE

In Osorno, as in other Chilean towns populated by Germans, the children are taught German as well as Spanish.

Photograph by Rollo H. Beck

WHALEBONE ON THE SHORE NEAR CORRAL

Whaling is an industry of southern Chile. It shows indications of increasing importance. One company captured more than 400 whales last season. These great mammals of the deep are said to come nearer the shore here than in other parts of the world.

PUNTA ARENAS, ON THE STRAIT OF MAGELLAN

Punta Arenas (Sandy Point), metropolis of the Strait of Magellan region, is on the mainland, facing Tierra del Fuego.

Photographs from Harriet Chalmers Adams

THEY GAVE TIERRA DEL FUEGO ITS NAME

It was the smoke from the campfires of the nomadic Alacaluf Indians that caused their region to be called "Tierra del Fuego" (Land of Fire). The Alacalufs, now practically extinct, wear guanaco-skin garments and anoint their bodies with fish-oil to keep out the cold.

Photograph from Publishers' Photo Service

A TUNNEL ON THE TRANSANDINE RAILWAY

The traveler crossing from Valparaiso to Buenos Aires is carried through one two-mile and many lesser tunnels which pierce the great Andean wall. During the winter months avalanches often block the track.

Photograph from Armando Peró

THE CHRIST OF THE ANDES

The old wagon-road over the Andes, in use before the completion of the Transandine Railway, is through the pass of Uspallata, more than 12,000 feet above the sea. Here stands the statue of the Christ of the Andes, cast from the bronze cannon of the two sister republics of the far south, to keep peace for all time. The inscription under the statue reads: "Sooner shall these mountains crumble into dust than the people of Argentina and Chile break the peace which they have sworn to maintain at the feet of Christ the Redeemer."

The conception of this monument came from the hearts of two Argentinos, Señora Angela de Costa and Bishop Benavente. As President of the Christian Mothers' Association, Señora de Costa undertook to raise the funds for the erection of the statue.

Photograph by Harriet Chalmers Adams

THE START ACROSS THE ANDES IN WINTER SNOWS

The author's party leaving the train at the Chilean station of Juncal for the start on mule-back over the Andes, at a time when the line was blocked by avalanches. The unbeaten trail, over slippery ledges and through deep snowdrifts, brought the travelers through the two-mile tunnel in the heart of the Andes into Argentina. There was then a second day's ride over icy wastes to the Argentine railhead where train traffic could be resumed.

The metropolis of Magallanes has taken on a pleasing, prosperous air.

This has long been an important fur market. Guanaco skins, pampa fox, cordillera wolf, white hare from the ice-fields, and muskrat are on sale. Belgian hares, introduced in recent years, have become such a pest that the government has placed a bounty on their heads.

In the old days seals, sea-lions, and otters were unmercifully hunted, the seal rookeries to the south eventually being destroyed. The seals used to devour the crabs which, with other shell-fish, swarm Fuegian beaches.

The most characteristic animal of the region, the guanaco, is now freed from the fear of the Indian-with-his-arrow, the enemy he has survived; but there is still the sheep ranger's shotgun. It is a pity that this animal has not been domesticated as was its cousin, the llama. Herds of several hundreds of these graceful, ruddy, dappled creatures may still be seen occasionally in the interior of Tierra del Fuego. Wild cattle, descended from those introduced by early settlers, are found in the mountains.

In the eighties there was a rush of miners to this part of the world. The prospector bought a boat instead of a burro and headed into the labyrinth of canals south of the Strait. Gold was to be found in the black beach sands beneath the frowning precipices and in the river beds. The gold fever now has passed, but dredges are still at work. Some of the disappointed miners took to sheep-farming.

One of the largest sheep-farming companies in the world is located in Punta Arenas, its dividends in the last four years amounting to $14,000,000. There are five canning and freezing plants in this territory.

Most of the Chilean sheep-ranges are on the Island of Tierra del Fuego, where the cold climate makes for firm flesh and thick fleece. Were we to marshal the Chilean sheep in one straight line, it

would just about stretch from New York to San Francisco.

Besides its sheep-farms and placer mines, Chilean Fuego has its coal deposits, of a rather poor quality, and an abundance of peat which can be used for fuel. Its lakes are all salty, some so rich in pure salt that the deposit is taken out by the spadeful and shipped to Punta Arenas for table use. When these islands, the tops of a submerged mountain range, rose from the sea the salt water remaining in the hollows formed lakes.

The wind here reaches a terrible velocity, being at its worst in the spring (our autumn).

Fuego is approximately 1,000 miles farther south than Cape Town, in Africa.

The forest is rich in conifers and beeches—a dark, gloomy, dripping forest, on the whole, yet the haunt of innumerable beautiful birds. I cannot here name them all. The albatross, penguin, pelican, cormorant, and their like seem at home here; but I had not expected to find a woodpecker (*Ipocrantor magellanicus*) and a thrush (*Turdus magellanicus*) peculiar to this region, or one of the parrot family so far south.

Great flocks of gorgeous flamingoes arrive from the north, followed by their inseparable companions, the white, black-throated swans. When startled, the flamingoes whirl aloft in a scarlet chain, forming a perfect triangle in the azure sky, and the devoted swans follow. An occasional sight is that of a number of tall wading birds, their legs imprisoned by the freezing of a lake, released only with the midday thaw.

A BLOODY PAGE IN CHILE'S HISTORY

In 1904 we still were able to find some of the original Fuegians. The Alacalufs, canoe Indians, used to inhabit the western reaches of the Strait; the Yaghans lived nearer Cape Horn. The Onas were to me the most interesting of the three groups. During the last years of the nineteenth century and the first fifteen years of this century these Fuegians steadily decreased and are now practically exterminated. It is a bloody page in Chile's history.

I am glad that I went there in time to see a little of the Onas, hunters and fishermen of no mean ability, with round, smiling, Mongoloid faces, elaborately painted, their hair bobbed. They wore fur caps and guanaco-skin garments, fur side in.

Poor souls! They got as far south as the continent permitted, but even then the white man crowded them off!

Cape Horn, on Horn Island, is Chilean, the tip end of South America. The cape, rising about 1,400 feet above the sea, withstands the pounding of the tempestuous surf. Only about one-third of the days of the year here are free from rain or clouds. Few voyagers see the cape, since ships steer a course well off shore. In southern Tierra del Fuego, mighty glaciers, reaching the sea, slowly break off and form icebergs which float toward Antarctic waters. It is, in truth, the dropping-off place of the Andes.

CROSSING THE ANDES IN WINTER

We have made three visits to southern Chile. On the last journey, instead of sailing around into the Atlantic, we returned to Valparaiso and crossed the Andes via the Transandine Railroad to Argentina. It was not, however, an uneventful journey in a Pullman coach, in the season when this trip of 888 miles can be made, very comfortably, in 48 hours.

Winter had set in. Avalanches in the mountains had blocked the road. After many fruitless trips to Los Andes, at the foot of the Cordillera, we at last joined a party of restless pilgrims determined to cross the Andes that very month aboard a valiant mule. We lived to tell the tale.

Two long days there were of it between the rail heads on either side of the mountains; two days of scaling icy ledges, plunging through snowdrifts. Our trail lay, not over the old summer wagon-road, past the Christ of the Andes, in the Pass of Uspallata, but through the two-mile railroad tunnel, 10,000 feet above the sea, which connects the sister republics.

Chile we left with its snowfields glistening in the sunlight; Argentina we entered in a wild snowstorm. That long, silent ride through a damp, inky, inner world left a deep impression, a feeling of awe of those stupendous heights, those mighty mountains we had followed throughout the length of Chile.

Photograph from Jill Jones

A JAPANESE FARMER PUMPING WATER INTO HIS PADDY-FIELD

This golden-skinned, full-chested, and strong-backed son of the soil turns water into his fields by stepping from tread to tread of this small paddle-wheel. Note the primitive plow used by the man in the background.

SOME ASPECTS OF RURAL JAPAN

By Walter Weston

Author of "The Geography of Japan," in the National Geographic Magazine

OF ALL the poetic titles applied by the Japanese in olden times to their land, perhaps the most ancient was that of Toyo-ashiwara-mizuho-no-kuni, "The fertile, reed-clad country, rich in grain." In this we have the intimation that from the earliest ages of the national existence agriculture has been the occupation of the majority of the people and their most fruitful source of livelihood.

The sudden emergence of modern Japan from the hermit-like seclusion of former days into the rush of busy intercourse and competition with the Western world has tended to blind the eyes of many observers to that which really forms the basis of its national prosperity.

It is only in rural Japan that we gain an insight into the most characteristic features of the life of the people. The real strength of national organization and the most attractive aspects of the national character cannot be fully appreciated until one passes from the crowded cities and westernized beaten tracks to the fields and farms of one of the most intelligent and friendly peasantries in the world.

In spite of the rapid strides made in the manufacturing and mining industries in recent years, agriculture still constitutes the chief source of the wealth and power of the Japanese people.

The rural population number sixty per cent of the whole, and it is they who supply the empire with most of its food and with the greater part of its raw materials for manufactures.

PRACTICALLY NO MACHINERY USED IN JAPANESE FARMING

There are few large landed proprietors, and a feature of agriculture is the tillage of small holdings. This is carried on by the whole of the farmer's household. The land does really belong to him, for the popular idea that both the peasantry and their fields are property of the Emperor is a mere legal fiction, and it is no wonder, therefore, that the man "on the land" works as few peasants in the world have ever been known to work.

Only about twelve per cent of the whole area of Japan is cultivable, and even this is not naturally very fertile. It is only made to yield its utmost by the most minute and careful system of subsoil working, manuring, terracing, and irrigation, and these are carried on with a thoroughness that almost suggests gardening rather than farming.

There is practically no machinery employed and nearly all the work is done by hand, hoe and spade, helped out at times by the ox or the horse. It is in the task of their subjugation of the land to the service of man that the best characteristics of the Japanese people have been developed—their boundless patience and perseverance, their intelligence, ingenuity, and self-control, their tough constitutions and temperate habits.

PEASANTS MAKE EXCEPTIONAL SOLDIERS

Some of the finest fighting men in the army are drawn from the peasant classes—hardy, stolid, and entirely unafflicted with nerves. Most of them come from the hill country, and their surroundings have left their impress on their character and habits.

It was remarked by British officers during the Russo-Japanese War that, in districts where long marches had to be made over routes chiefly leading along goat-tracks or across pathless gullies and crags, each man having to find his own way and to meet his company again on the other side, it was the native mountaineering habitudes of the lower ranks that led them to take the best possible line of country.

In mountain warfare the hillmen among the Japanese infantry displayed—as compared with other infantry—some of the attributes and mobility of cavalry. Moreover, there is something in the open and communistic character of the daily life of the country people (for to them privacy is an unknown condition) that renders

Photograph from Publishers' Photo Service

THE TEA-PICKERS OF JAPAN WEAR LONG SLEEVELETS OR GLOVES TO KEEP THEIR HANDS AND ARMS FROM BEING SCRATCHED

them natural and considerate and promotes a resourcefulness and readiness to help each other that must be experienced to be understood.

It is among such as these that one finds human nature most unsophisticated and unspoilt, nor has all that is artificial and materialistic in our vaunted twentieth-century civilization yet laid a paralyzing hand upon that inborn simplicity and courteous bearing which in days gone by did so much to justify the title by which the Japanese delighted that their land should be known—*Kunshi no Koku*—"The Country of Gentlemen."

One of the most striking features of the countryside, to one who wanders out from the crowded life of the great towns, is the extraordinary and minute care with which the hills, rising abruptly, as most of them do, from the alluvial plains and the seashore, are terraced from base to summit, wherever a single ear of rice or corn can be made to grow, the resultant landscape resembling nothing so much as a gigantic chessboard decked in yellows, gold, and greens of every shade.

What makes these agricultural achievements the more astonishing is the fact that they are attained with the most primitive of instruments, for the peasantry are the most conservative class in the nation. The whole of their agricultural system was borrowed from China nearly two

Photograph from E. Gertrude Beasley

GATHERING LEAVES FOR FUEL SEEMS TO BE A CONGENIAL OCCUPATION IN JAPAN

thousand years ago and has known practically no change. The plow they use is that of the Egyptians of the days of Pharaohs, and spade, hoe, sickle, harrow, and flail differ but little from those of their instructors. The wagon and the wheelbarrow are almost unknown.

Of all the ancient and popular festivals of Japan, those that are celebrated with the greatest zest and enjoyment invariably belong to the life of the countryside and form a standing witness to the primeval and paramount significance of agriculture to the entire nation. The so-called "national ones," dealing with alleged historical events, are of official origin and nearly all quite modern. Their observance is chiefly confined to the large towns and exercises comparatively slight influence on the popular sentiment or imagination. To the outer world, these are sufficiently unfamiliar and significant to deserve record by way of illustration.

THE FESTIVAL OF THE FOX GODDESS

One of the earliest in the year is that of Inari-Sama, the Goddess of Food, at whose gaily decorated shrine services of intercession are held on the first day of the second month (old style)—*i. e.*, March—on behalf of a fruitful rice harvest later in the year. Inari-Sama (about whose sex there is some ambiguity) is sometimes spoken of as the Fox Goddess,

Photographs by T. Enami

THRESHING RICE THROUGH A FRAME SET WITH IRON TEETH

The Japanese farmer accomplishes the most astonishing amount of work with implements like those the Egyptians and early Chinese used thousands of years ago. From the latter Japan borrowed her whole agricultural system.

UP TO THEIR KNEES IN WATER TRANSPLANTING RICE SHOOTS

The sunshades worn by the laborers are made by the women and girls from shredded strips of that "lady of grasses," the bamboo. They are not woven on frames, but get their shape from the manipulation of the materials in the weaving.

TO KEEP THE HOME FIRES BURNING

Nearly one-half the forest area of Japan belongs to the state and the imperial household. Some coal is mined in the islands, but the chief dependence for fuel is on wood.

Photographs by T. Enami

THE MOTHER AND ONE OF THE BABIES GET A STRAW RIDE

The coöperation of the entire family is necessary to make the Japanese farmer's business a success. Here old and young are seen returning home after a day spent in the rice fields.

HAPPY BECAUSE THE NEW CROP WILL SOON BE IN

The Japanese farmer's devices for cultivating the soil are curious in their primitiveness. The picture shows the wooden spade used for turning up the soil. The remainder of the cultivation will probably be done with a heavy single-bladed hoe for digging, a three-prong hoe for breaking the soil, and other queer home-made things, such as sickles and pruning-hooks with straight handles and curved blades set at right angles.

Photographs from E. Gertrude Beasley

"THE PLOWMAN HOMEWARD PLODS HIS WEARY WAY"

Photograph from Jill Jones

MILADY'S SILK FROCK IN ITS TRULY EMBRYONIC STAGE

"The honorable little gentleman," as the Japanese call the silk-worm, contributes $100,000,000 to the annual income of the Mikado's people. During the period of its intensive cultivation its voracious appetite keeps whole households busy satisfying its mulberry-leaf needs.

and is commonly identified with her servant the fox.

In view of the all-importance of rice to the whole nation, it is natural that this divinity should be held in such honor, not to say dread, and we find that these festal gatherings partake of the nature of a combination of communion, eucharist, and love-feast. Papers stamped with the picture of a fox are pasted on cottage doors as charms of exceptional potency.

This animal is credited with supernatural powers of bewitchment, and the belief in *Kitsune tsuki* — "Fox-possession"—is very real and widespread. It belongs to a class of folk-lore and superstition of which little is known outside their own country, and but half acknowledged by the educated Japanese themselves, though it is of much psychological and scientific interest to the student and the medical man.

HONOR FOR THE POWERFUL RIVER GODDESS

Japan is one of the most richly watered countries in the world, and as nearly every swift-flowing river and impetuous mountain torrent has its own presiding divinity, we are not surprised to find them credited with power to hurt or help the lands through which their waters pass.

In districts liable to damage through inundations, services of intercession are held in the third month, our April, at popular shrines like those of the River Goddess of Kofu, in the broad and fertile plain of Koshu, in central Japan.

The goddess is taken out for an airing in her sacred car and earnest supplications are addressed to her for the protection of the fields and farms of the peasantry in the coming days when, with the melting of the winter snows and the storms of early summer and autumn, the myriad mountain torrents swell the parent rivers on their resistless course through the cultivated plains to their wide and populated deltas at the sea.

The month of May sees the countryside under its brightest, busiest, and most varied aspects, and in all its activities

nearly every one, old or young, has his or her part to play. Barley, wheat, and (especially) millet are ripening and "honorable" tea is now ready to be picked.

The grains enumerated are the real staple food of the rural districts, for though all, who can, live on rice, most of the peasantry, especially in the remoter parts, cannot afford to do so and only indulge in it on high days and holidays or in cases of sickness.

A friend of mine tells me of an old lady whom he heard remark of a sick neighbor in a country hamlet, with a grave shake of the head: "What! do you mean to say that it has come to giving her rice?" In other words, "The poor thing *must* be in a bad way!"

SUPPLICATION IS MADE TO GOD OF HAILSTORMS

The chief festival of this season is that of the God of Hailstorms, and many an anxious farmer in the silk-producing districts in the great inland provinces of Shinano and Kai then visits the ancient village shrine to pray for the preservation of his precious mulberry trees from the dread scourge.

Strangely enough, however, these trees are said to be almost immune from lightning, and there is a popular belief that a man caught in the open in a thunderstorm has only to call out *"kuwabara"*—*i. e.*, "mulberry grove"—in order to surround himself with the prophylactic properties of that valued object and so avert the threatened danger.

The Christian Japanese farmer can read with sympathetic interest the story of the plague of hail in Exodus ix, where we learn that *"the flax and the barley was smitten: for the barley was in the ear and the flax was bolled"* (*i. e.*, in bud).

Nearly every article of food and domestic utility is committed to the care of its own guardian divinity, and a Japanese writer has observed that, if the interests of the peasantry are not protected by unseen powers, it is not for want of earnest supplications addressed to them at all seasons and for every possible boon desired.

Of special significance is the festival of the rice harvest, with its twin observances (like those of the ancient Hebrews) of the offering of the first fruits—in the middle of October—known as *Kannamesai*, with its complement in the *Niinamesai*, on the 23d of November, when the Emperor tastes the new rice that has just been presented at the holiest of all the shrines of Japan—that of the Imperial Ancestors at Ise—at the climax of the ingathering.

The former of these festivals is an essentially popular one, and the best of the precious grain is presented at thousands of village altars throughout the length and breadth of the land.

Close by these, on the stages which are usually found at the side of the most ancient shrines and erected for the purpose, a pantomimic dance, known as *O Kagura*—"The Seat of the Gods"—is then performed to entertain the guardian divinity in grateful acknowledgment of his kindly care, a thought which is further impressed on the children themselves by the closing of the schools, in order to set them free to keep the festival with innocent gaiety.

The arrangements which enable neighboring villages to hold their celebrations on different days, like those in English country parishes at harvest-tide, and so to share their mutual rejoicings, make for a friendly community of interest and neighborly good feeling.

EBISU IS THE DEAF GOD AMONG JAPAN'S EIGHT MILLION DIVINITIES

There is one other festival which is highly popular with the peasantry in late autumn, that of Ebisu, the God of Honest Hard Work, as well as of Wealth. This is kept with twofold energy, partly because all desire to be rich and partly because, on the basis of "sympathetic magic," it is felt that one who controls the gift of prosperity should naturally be courted with every sign of merriment and enjoyment of the good things of life.

At this festival, in the Province of Kii, when the procession bearing the appropriate offerings approaches the shrine the village head-man calls out in a loud voice, "According to our annual custom, let us all laugh"; to which exhortation a hearty response is given.

The reason given for this is that Ebisu alone of all the eight million divinities has not gone to visit the great Shinto shrine in Izumo on the annual holiday

Photograph from Professor David M. Robinson

THE CHINESE GATE LEADING TO THE MAUSOLEUM OF IYEMITSU AT NIKKO

Figures of storks, a white dragon set upon golden waves, and the heads of lions surrounded by arabesques and friezes of chrysanthemums, peonies, pines, bamboos, and birds are among the ornate carvings which distinguish this famous Kara-mon as one of the most beautiful gates in Japan. More than six acres of gold leaf were used in gilding the shrines of the sacred city of Nikko, impressive memorials of the pomp and glory of Japan's Yedo period.

Photograph by Kiyoshi Sakamoto

REGAL POMP AND KALEIDOSCOPIC COLOR MARKED THE GREATEST BUDDHIST MASS EVER HELD IN JAPAN

The renowned Hongwan-ji Temple in Kyoto was the scene of this religious ceremony of indescribable solemnity and beauty when more than one hundred thousand followers of Shinran-Shonin, thirteenth century founder of Shinshu Buddhism, assembled from every corner of the Japanese Empire to participate in a tribute to the memory of the priest whose precepts are followed by more than seven million subjects of the Mikado.

Photograph by Kiyoshi Sakamoto

NOBLES OF KYOTO PLAYING THE ANCIENT JAPANESE BALL-KICKING GAME, SHUKYU

Attired in the colorful costumes of a former day, these titled players are reviving a pastime which was popular in Japan more than a thousand years ago. The ball, resembling a toy balloon, may be descried high in air above the head of the lavender-robed spectator in the background. While it is a football game, it, of course, differs radically from the American sport of the same name.

Photograph by Kiyoshi Sakamoto

PAYING HOMAGE TO THE MEMORY OF A GREAT JAPANESE POETESS

These three little maids are in the room of the Ishiyama Temple where the noted woman writer, Murasaki Shikibu, wrote one of her masterpieces, "Genji Monogatari," a classic romance, more than nine hundred years ago. For some reason the fireflies are larger in the vicinity of this temple than in any other region of Japan.

Photograph by T. Enami

FLOWERS OF JAPAN

This chrysanthemum garden in Yokohama provides a charming background for the Geisha quartet garbed in their soft-hued, silk kimonas. The "shimada" coiffure is usually a badge of the unmarried woman among the Japanese. While the roof of this greenhouse is of glass, the chrysanthemum fancier frequently uses inexpensive oil-paper to protect his blossoms from the frost.

Photograph by Kiyoshi Sakamoto

YOUNG JAPAN IN NEW YEAR'S REGALIA

The love of flowers and a highly developed sense for color values, strikingly indicated in this and other illustrations of this color series, are among the generally recognized attributes of the idealistic and artistic sides of Japanese life, which are entirely distinct from, and should not be confused with, the social, economic and political phases of life among the people of the Land of the Rising Sun.

Photograph by Kiyoshi Sakamoto

A FARMER'S DAUGHTER STOPS TO REST WHILE ON HER WAY TO THE CITY MARKET

In her hands she holds the doughnut-shaped mat of straw which she uses as a pad when carrying her bundle of fagots on her head. This is not the every-day garb of the farm laborer; she is in her "Sunday best," for her fuel must be peddled from house to house in town.

Photograph by Kiyoshi Sakamoto

THE JAPANESE IN PAGEANTRY DELIGHT TO RECALL THE DAYS OF THE SAMURAI

Every summer a famous festival is held at Kyoto, when magnificent floats and brilliantly costumed groups parade the streets of the former capital of the Empire. The man on horseback sheltered by the ceremonial parasol is wearing the costume of a general. The attendant on his right holds a dipper from which he gives water to the horse from time to time.

Photograph by Kiyoshi Sakamoto

PRIESTS OF THE SHINTO FAITH IN PROCESSION

"The Way of the Gods" is the meaning of Shintoism, a cult of nature-worship and ancestor-worship with the Sun Goddess and Great Ancestress of the Japanese Imperial House, as the chief deity. Women serve as dancers in the Shinto temples.

Photograph from Professor David M. Robinson

THE GRAND GATEWAY TO ONE OF THE SHRINES AT NIKKO, BOWERED IN CEDARS

When these shrines were begun three centuries ago, the government ordered the wealthy Daimyos, or provincial chiefs, throughout Japan to make contributions according to their means. One of the chieftains, though he had a retinue of 6,000 Samurai, had neither gold nor silver nor precious stones to give, so he offered as his humble donation thousands of young cedar plants. Today, these centuries-old trees, like the Widow's Mite and the rejected Cornerstone of Biblical history, are among the most priceless possessions of the shrines.

Photograph from Jill Jones

JAPAN HAS ITS STROLLING MINSTRELS IN THE HAPPY MONTH OF JANUARY

As an incentive to gaiety during the festive New Year season, street entertainers are a picturesque feature of city life. The youth with the fan is a singer who is accompanied by the boy to the right, who beats the drum shaped like an hour-glass. The peasants of Holland wear sabots; those of Japan, the geta. Every man, woman and child tries to smile and be happy on New Year's Day, for as one begins the year so he shall end it, according to the universal belief of this people.

Photograph by Kiyoshi Sakamoto

RAFTSMEN RUNNING THE RAPIDS OF THE HOZU RIVER

Thousands of tourists have shot through this cascade near Kyoto and have been thrilled by the daring and skill of the four men who pilot the flat-bottomed craft used by passengers, but far more exciting is a trip through the turbulent waters aboard an unwieldy raft. The yellow object in the water to the right is a Japanese jetty made of bamboo and filled with rocks.

Photograph by Kiyoshi Sakamoto

GATHERING MATSUDAKE MUSHROOMS AMONG THE HILLS NEAR KYOTO

As the young people of America hunt for chestnuts in the fall, the young folk of Japan organize festive "Matsudake" parties. They carry their musical instruments with them in their rambles among the hills and not infrequently Geisha girls accompany the merry-makers, giving their rhythmic dances to the accompaniment of drums, flutes and the guitar-like shamisen.

Photograph by Kiyoshi Sakamoto

"THE WILD CHERRY BLOSSOM REPRESENTS THE SPIRIT OF THE TRUE JAPANESE"

"When in spring the trees flower," sings a poet of old Japan, "it is as if fleeciest masses of cloud, faintly tinged by sunset, have floated down from the highest sky to fold themselves about the branches."

Photograph by Kiyoshi Sakamoto

THE MATINEE HAS ITS LURE FOR THE JAPANESE MAIDEN AS WELL AS FOR MISS AMERICA

These three devotees of the theater are on their way to a performance advertised by the hand-drawn posters seen at the top of the illustration, and the name of the star, Tayu Takemoto Koshiji, is blazoned on the panel at the right.

Photograph by Kiyoshi Sakamoto

PREPARING A PUMPKIN IN A JAPANESE KITCHEN

Dainty Mrs. Nippon does not practice pie-making; she chops her vegetables into bits the size of a match box and boils them. About her head she wears a figured tenegui, the oriental variant of the American boudoir and dust caps, which she will remove before she sits down to dinner or meets a guest at the door.

sacred to them; for he, being deaf, could not hear the summons thither. And so his worshipers seek to cheer him in his loneliness by their own infectious merriment.

It is a natural instinct of the human heart to feel that this act must be acceptable to the object of its most unfettered rejoicings: *"Let us come before His presence with thanksgiving and show ourselves glad in Him with psalms."*

JAPAN PRODUCES 4,000 VARIETIES OF RICE

It is impossible to get a clear idea of the life of rural Japan until we realize the all-importance of the rice crop to the nation at large. Two-thirds of the cultivated land is devoted to it, and no less than 4,000 varieties are produced, while, as we have seen, it is the sowing, transplanting, and ingathering of it that form the chief occasions of popular solicitude and rejoicing.

Until, at the Restoration, in 1868, the Daimyo, the old feudal lords, retired into private life, their incomes were paid in rice, and to-day the peasants pay their rent in the same commodity.

Only when we have wandered observantly off the beaten tracks and listened to the chance scraps of conversation among the country-folk in the summer months, and heard most of it bearing on the state of the crops and the probable prices ahead, can we appreciate what the precious grain means, even in these days of growing industrialism, to the people of Japan.

Japan is not only the third most important rice-producing country in the world, but its rice stands first in quality. In its cultivation all is carried out according to the strictest rule, with a conservatism born of experience. The sowing, for instance, *must* take place on the 88th day of spring, the first day of which is also New Year's Day.

Before sowing, the seed is soaked in salt water for a week, washed in fresh water, and then dried, after which it is planted in well-watered "nursery" beds. About the end of May it is transplanted into "paddy" fields in small bunches about a foot apart, an operation employing hundreds of thousands of men and women knee-deep in water and mud.

This is an occasion of great rejoicing and is celebrated with special songs, known as *ta-ue-uta*—"rice-field planting songs."

THE MOST MOMENTOUS PERIOD OF THE YEAR

The most momentous period of the whole year, however, comes at the end of August or the beginning of September, when the *ni-hyaku-toka* draws near—the "two hundred and tenth day"—for it is the ten days which then follow that form the season of intensest anxiety, of mingled hopes and fears, through which the bulk of the population of Japan passes from year to year.

The rice is then ripening fast, and it is a gentle breeze that is urgently needed, although it is just at that precise moment that there is usually the gravest peril threatening, in the dread typhoon, which not only marks the break-up of summer, but incidentally the breaking up of much else.

With the ripening of the various crops in their proper seasons and with the birds and countless varieties of insects in which Japan so abounds eager to prey on them, the fields are dotted over with little flags of bamboo and paper inscribed with charms against their depredations. These are called *mushi-yoke* — "vermin-dispellers"—and are bought at shrines of repute all over the country.

"THE HONORABLE LITTLE GENTLEMAN"—THE SILKWORM

Next in importance to rice come the silk and tea industries, which furnish revenues of some $100,000,000 and $25,000,000 respectively, silk being produced mainly in central and tea in central and southern Japan.

There are many features of peculiar interest connected with the cultivation of silk, of which not the least is the treatment of the precious worm itself. It is popularly called *O ko sama*—"The honorable little gentleman"—and during the period of his "intensive cultivation," mainly the month of August, the satisfaction of his voracious appetite keeps whole households occupied day and night, to the exclusion of all else.

Photograph from Jill Jones

A PORTABLE FESTIVAL SHRINE CARRIED BY JAPANESE LADS

Out of the agricultural life of the countryside have grown those festivals which the people celebrate with the greatest zest and enjoyment.

Photograph by Kiyoshi Sakamoto

ANCIENT COSTUMES AND THE FLOWER UMBRELLA USED DURING THE AOI FESTIVAL

This festival is held every year in honor of the Tokugawa Shoguns, who were for 250 years the *de facto* ruling power in Japan. The "aoi," or wild ginger leaf, appears on the crest of the Tokugawa family.

The leaf-strewn trays, arranged in tiers, fill nearly every room in the house, and the sound of the ceaseless nibbling of the countless myriads is precisely that of the scratching of a thousand pens in the great hall of a college or university on an examination day.

It is believed that any harsh or noisy, ill-bred conduct on the part of persons within earshot of the little creature will seriously affect the quality of the silk produced.

SUGARLESS TEA

Of tea, the national beverage of Japan (drunk always without sugar or milk), we cannot speak in detail. Like most good things in Japan, it was introduced from China about 800 A. D., and for one thousand years its use was almost confined to the aristocracy and the court. It is picked after three years' growth of the plant and is nearly all consumed in the country, with the exception of some fifty million pounds exported to Canada and the United States.

Not the least interesting of one's acquaintances in rural Japan is the country policeman — ever ready to act, when needed, as guide, philosopher, and friend—upon his lonely beat. Some years ago he received the following counsels from police headquarters for the benefit of the unsophisticated of the countryside, the unconscious humor of some of these admonitions suggesting that the person who drafted them did so somewhat feelingly:

"No criticisms should be made, either by gesture or words, regarding the language, attire, or actions of foreigners.

"Foreigners are most sensitive regarding cruelty to animals; therefore special attention should be given to this matter.

"If a foreigner pulls out his watch and looks at it, you should think that he has business elsewhere, and that it is time for you to leave.

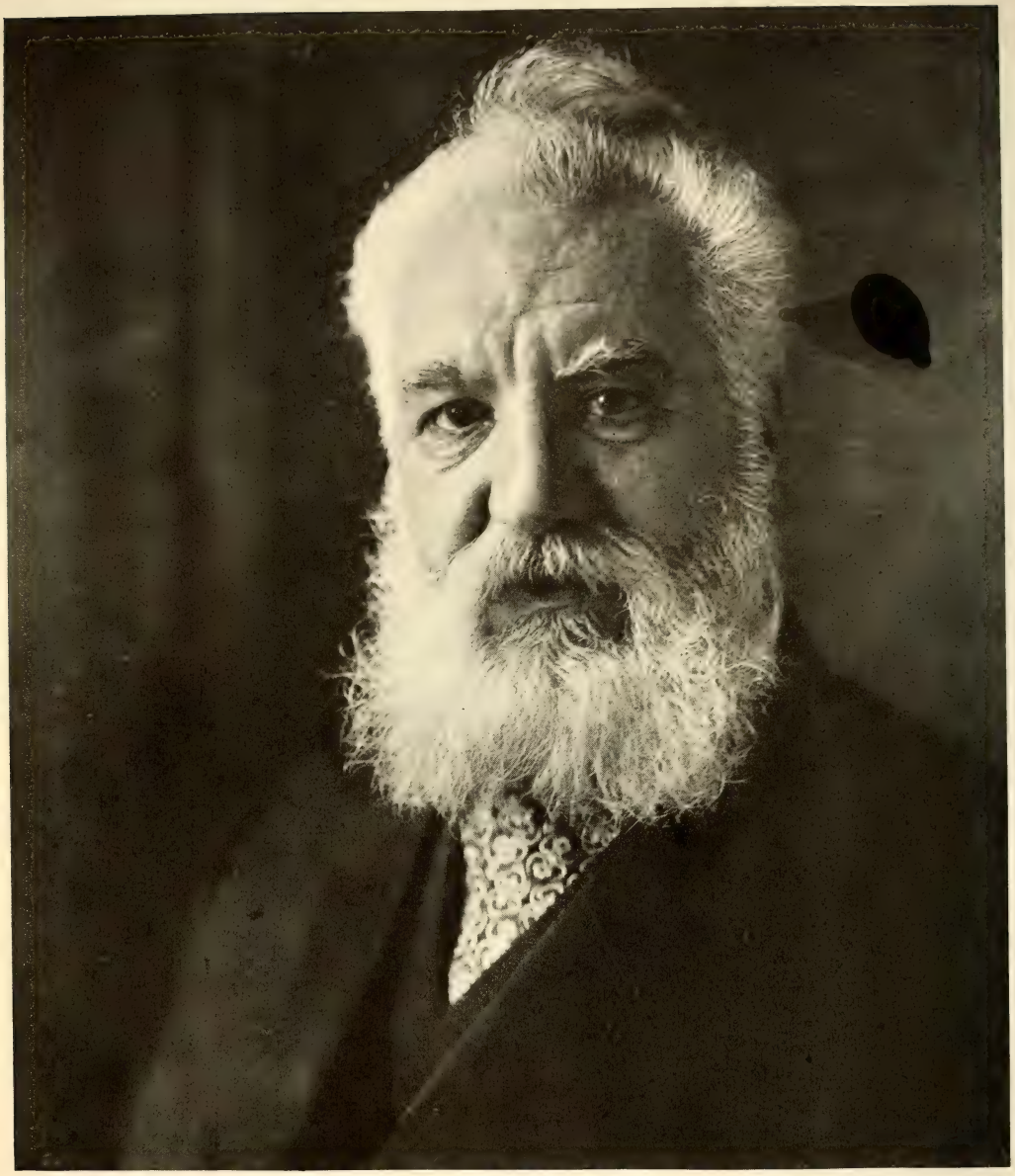
"It is a mistake to suppose that a foreigner will always respond to a request for a loan of money."

During one of my explorations in the Japanese Alps I met a little policeman—the exact circumstances need not now be specified—who insisted on sharing my little room in the primitive hut where we spent several nights. He also insisted on sleeping on the floor, underneath my hammock, which I had slung to a convenient beam in the roof. And yet when I chanced to roll out during my sleep he made no further reference to this startling interruption than to murmur a word of polite apology: *"O jama wo itashimashita!"*—"I am so sorry to have been in your honorable way!"

At the close of the paper contributed to THE GEOGRAPHIC for July, 1921, I spoke of the strange contrasts that may often be met with in modern Japan and which cause one almost to rub one's eyes and ask whether we are living in the twentieth century or the tenth.

Since those words were written a curious illustration of this has come to my knowledge. Near the famous Naval Yard of Kure, in southern Japan, a ceremony was recently held for the souls of departer bullocks! One hundred oxen, gaily garlanded, were led in solemn array to one of the chief Buddhist temples, where suitable prayers were said on behalf of their departed comrades. This was followed by instruction in the Buddhist scriptures, and finally they were given a grand feast by their masters, who apologized for all the unkind things they had done to them!

A mile away Japan was building one of the biggest battleships in the world!



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ALEXANDER GRAHAM BELL

1847—1922

SCIENTIST PATRIOT EDUCATOR

The Board of Trustees of the National Geographic Society, with profound regret, announces to the membership the death of Dr. Alexander Graham Bell, a founder, former president, and senior trustee of The Society. Dr. Bell died at Baddeck, Nova Scotia, August 2, 1922.

GILBERT GROSVENOR,
President.

MAP-CHANGING MEDICINE

By William Joseph Showalter

Author of "The Panama Canal," "The Countries of the Caribbean," "Redeeming the Tropics," "How the World Is Fed," "Exploring the Glories of the Firmament," etc., in the National Geographic Magazine

THREE announcements of almost unprecedented import to mankind are expected to be made at no distant date.

The first of these, chronologically, at least, will be that yellow fever has at last been banished from the face of the earth, and that the germ which causes it has become extinct, along with the dinosaur, the dodo, the great auk, and the passenger pigeon.

The next in order will probably be that hookworm disease, which has been called "a handmaiden of poverty, an associate of crime and degeneracy, a destroyer of energy and vitality, a menace and an obstacle to all that makes for civilization," and which is endemic in a zone that embraces half of the earth's population, can be driven from any community which has the will to get rid of it.

Last, but not least in importance, will come the statement that large-scale demonstrations have proved that malaria can be eradicated from almost any community that has enough vital force left to push a thorough, though inexpensive, campaign for its extirpation.

These history-making announcements are safely forecast by an examination of developments in the world-wide warfare on disease being waged by the sanitarians of the world under the leadership of such agencies and institutions as the United States Public Health Service, the health departments of the several States, the British Schools of Tropical Medicine, the India Office, the Dutch Institute for Tropical Medicine, and the French Institute of Colonial Medicine.

PREVENTIVE MEDICINE'S GREAT VICTORY

In all the stirring story of man's effort to make himself master of his environment, there is not a more thrilling chapter than that which tells of the bitter battles he has waged for the conquest of contagion, and of the ground he has won in his struggle with his relentless and innumerable, though invisible, foes.

The World War served to demonstrate that the tyranny of the pathogenic or disease-producing germ can be conquered.

Straining every nerve for victory, the nations that faced the foe from Bagdad to Bruges had to make sure that epidemic disease should not attack the firing line from the rear. Consequently, half-way and temporizing methods were taboo and preventive medicine had free reign.

REMARKABLE CONTROL OF EPIDEMICS DURING THE WORLD WAR

The results were amazing. Although never before in human history was there such an intermingling of peoples, such a crossing and recrossing of seas, such an invitation to contagion to spread to the ends of the earth, only one epidemic succeeded in breaking the barriers erected by the sanitarians.

And as if to emphasize man's power to master the major contagions, not one of those with which the world's public health officials were familiar escaped from the regions where it was endemic, while influenza, which was a stranger, broke away and swept over the face of the earth.

India was a hotbed of smallpox. Nine millions of its population were vaccinated, without a single death therefrom, and the disease no longer threatened that land's participation in the war. The Philippines contained enough cases of the same scourge to set the whole world aflame. Millions were vaccinated there, again without the death of a single person, and smallpox disappeared. Typhus, likewise, was practically held to lands where it existed before the outbreak of hostilities.

Conditions in the trenches were such that the battle lines of France might well have become an inferno of infection; but preventive medicine stepped in and held typhoid fever, malaria, and other communicable diseases in check in a way that was startlingly effective.

It was natural, therefore, that when peace came again the lessons of preven-

Photograph by Earle Harrison

BOYS OF WESTERN MARYLAND, WHERE A GREAT HEALTH BATTLE IS TO BE WAGED

Washington County, Maryland, of which Hagerstown is the county seat, is about to be made the greatest field laboratory for preventive medicine in the world. It is a typical, prosperous American community of sixty thousand, equally divided between rural and urban population. The agencies supporting the work will investigate all epidemics, frame rules for their elimination, provide a staff of visiting nurses, and coöperate with the local physicians to make this the country's model of what a community should be in matters of health.

USING THE ELEPHANT TO ADVERTISE GOOD HEALTH IN LEE COUNTY, MISSISSIPPI

After the people of this county saw the benefit of "unhooking the hookworm," they decided to wage war on infectious diseases in general. Even the circus elephant was pressed into service to proclaim the importance of the campaign.

tion and sanitation learned during the World War should have driven themselves home in the minds of those who think in terms of world welfare. Taught that epidemic diseases, which plainly constitute the major menace to civilization in peace times, can be mastered, the sanitarians threw themselves into the fray with redoubled energy.

Casting about in the early days for the best pathogenic foe to attack in a great after-the-war campaign for international health, many of these agencies decided to concentrate on hookworm disease. For here was a human ailment sapping the strength of hundreds of millions of people throughout the frostless belt of the earth—a principal cause, indeed, of their individual and collective exhaustion.

No other disease is as easily cured. The demonstration both of its cause and elimination was amazingly simple: a dose, say, of Epsom salts, a dose of thymol, another dose of salts, followed by the elimination of scores and even hundreds of life-sapping worms.

The effect on the patient was so beneficent that he who ran might note it; the result to every community in which the work was undertaken was that the public acclaimed its success, and made ready to carry the campaign forward with its own funds; the outcome was that, having begun a war on the hookworm, communities gradually found it worth while to extend the campaign to other forms of infection, and to sanitation in general.

Tetrachloride of carbon, a simple and popular "cleaner," has recently been tried with marked success as a substitute for thymol, but whether it will become the favored vermifuge in hookworm removal depends on further tests.

HALF THE PEOPLE ON EARTH LIVE IN THE HOOKWORM ZONE

Reaching as far north as the latitude of Nashville, Tennessee, and Osaka, Japan, and as far south as that of Valdivia, Chile, and Wellington, New Zealand, the hookworm zone of the earth embraces more than half its population.

Photograph by Earle Harrison

A MOUNTAIN HOME IN GEORGIA

There is nowhere a purer strain of colonial American blood than one finds among the mountain whites of the South; yet hookworm infection took its unceasing toll of their vitality until they had lost most of the vigor of their ancestors. Hookworm eradication among them has already worked wonders.

It is within this zone that most of the world's backward peoples live, and there is much ground for saying that perhaps the chief part of their backwardness is due to the cumulative effect of the disease—physical, economic, intellectual, and moral—upon the race.

More serious, indeed, than the high mortality rate among individuals of the living generation is the accumulating deterioration of the race, due to poverty and its consequences, transmitted to future generations.

When operating in conjunction with that other microscopic monster, the malaria germ, the hookworm is doubly an evil, and both diseases reach their highest development in the same environment—the hot, damp regions of the earth.

The malady caused by the hookworm is one of the most serious of the disabling afflictions to which mankind is subject. It affects fundamentally the welfare of humanity over vast and populous regions, lowering the victims' resistance to other infections, dulling the mind, sapping the strength. Its effects express themselves in stunted mental and physical growth and lead to degeneracy and decay.

With its onset insidiously gradual, it is far less spectacular than smallpox or yellow fever; but the deaths directly or indirectly traceable to it are higher in percentage than those traceable to almost any other disease except tuberculosis. As a slow-acting cultivator making the human system a fertile field for the grim sowers of fatal infections, it is, perhaps, with the exception of malaria, the world's outstanding malady.

MAKING THE HOOKWORM PREACH SANITATION

Yet, owing to the fact that its every stage is so well known, that the methods of combating it are so dramatically effective, and that those who are cured so quickly begin to experience the joys of living once more, it makes itself the most readily and successfully used of all diseases with which to point a community toward a goal of better health.

As stated previously, a dose of Epsom salts, castor oil, or other purgative, a dose of the oil of thyme, or chenopodium (the former from a plant that grows in our gardens, and the latter from one that is a cousin of the common lamb's quarter), followed by another dose of Epsom salts—and presto! scores and hundreds of small worms are expelled from the system and may be exhibited before the victim's eyes.

Presently the erstwhile victim, relieved of the inexorable board bill of vitality which his hundreds of sponging guests forced him to pay, begins to feel his "pep" returning, his strength coming back, and his whole life being transformed from a dragging existence into a quick-stepping, energetic activity.

These dramatic results, widely attained, constitute such a convincing "before" and "after" exhibit that doubting Thomas himself is made to believe, and even the backward community that still doubts the efficacy of vaccination against smallpox, that still pooh-poohs the value of water-purification against typhoid, that still believes tuberculosis is hereditary and not infectious, becomes a center of enthusiasm for hookworm-control.

SEED THAT HAS BEEN WELL SOWN

The hookworm, therefore, lends itself admirably to the cause of community sanitation, as the entering wedge through which the shackles of fogeyism are broken, and through which an opening is made for that faith and coöperation which is the very foundation stone of preventive medicine.

To-day those Southern States' communities whose health organizations took up the anti-hookworm war have the satisfaction of knowing that hookworm disease has been greatly reduced, both in severity and prevalence; that the people have been enlightened as to its importance, its relief, and the means of its final control; that permanent agencies committed to its elimination have been rooted in the soil; and that a sustaining public sentiment has been created in the interest of more general measures for the better protection of the public health.

Through the spirit of health progress thus created, legislative appropriations for public health purposes in the South have increased more than 500 per cent during the past decade; full-time county health organizations are being developed; and,

AN ANTI-HOOKWORM SQUAD IN BELAIR, ST. VINCENT, BRITISH WEST INDIES

AN OFF DAY AT A NICARAGUAN HOOKWORM LABORATORY

Any one who has traveled through tropical countries can appreciate what a vast need there is for freeing the millions of people who dwell in the hot lands from the health-sapping, strength-draining dominion of the hookworm.

Photograph from the Philippine Bureau of Science

AN OUTPOST IN THE WORLD WAR AGAINST THE HOOKWORM: LAS PINAS, PHILIPPINE ISLANDS

American altruism goes to the ends of the earth to offer freedom from infectious diseases to those who will accept its help and guidance.

through a tax-supported health service, state and local, the certain outcome will be the final and complete control of hookworm and other preventable diseases.

How rapidly general sanitation has moved forward in the Southern States under the stimulation of the war against the hookworm is shown by the fact that there are now approximately 131 counties in twelve States which have full-time health departments.

In Virginia the number of cases of typhoid fever was cut from 14,398 in 1909 to 2,493 in 1920. The reduction of the death rate from typhoid fever registered for three years in North Carolina, applied to the United States, would mean an annual saving of 13,000 lives.

A VAST TASK STILL AHEAD

The widespread incidence of hookworm disease is shown by the fact that three out of five persons examined in China have it, three out of four of those in Siam, and five out of eight in various parts of India. It is estimated that two-thirds of the 45,000,000 people of Bengal have the disease, and that more than one-half of the 300,000,000 inhabitants of India are victims of it.

Similar conditions prevail in Brazil, Colombia, Central America, the West Indies, and elsewhere, and if one were to reckon up the total number of the people of the earth who labor under the hookworm handicap it would probably be four or five times as many as there are inhabitants of the United States.

UNHOOKING THE HOOKWORM

In its campaign against the hookworm, one agency prepared, and lends to the various communities fighting disease, a motion-picture film which, with a full appreciation of human interest, it has named "Unhooking the Hookworm." The hatching of the egg, the creature's penetration of the human body, its progress through the blood, lungs, and throat to the digestive tract, its parasitic rôle, and its propagation are set forth vividly by micro-photographic pictures and ingenious animated

© R. Lenz and Co., Bangkok

THE ROYAL PALACE AT PETCHABURI, SIAM

Malaria and hookworm disease, marching hand in hand, have levied a heavy toll upon half of the earth's inhabitants. To-day these twin curses of humanity are gradually yielding ground and are being forced to travel the road of smallpox and typhus.

Photograph by Earle Harrison

A MOUNTAIN HOME IN THE SOUTH

"So as to be up and around" and "I can't complain" were the usual answers to inquiry about one's health in the mountain sections of the South before the war against the hookworm; for few could ever say, "I am feeling fine." There is no physical or mental vigor or joy of living among those who harbor hookworms.

A WEST INDIAN NEGRO WOMAN WHO IS PROUD OF HER HEALTH CERTIFICATE

designs, successive scenes illustrating the causes of soil pollution, the process of infection, the symptoms of the disease, the methods of treatment, the results of cure, and the need of sanitary precaution. The film is being exhibited to-day under some twenty different flags.

SUCCESS GREATER THAN WAS ANTICIPATED

For a long time it was believed that hookworm disease could not be reduced to a stage where it would be harmless, without completely successful efforts to prevent soil pollution.

Resurveys of various areas in the South, in Porto Rico, and elsewhere, where community treatments had been administered, showed a gratifying reduction in the percentage of people infected, but not enough to promise the extirpation of the disease.

But, on a reëxamination of those previously treated, the percentage, based on the number of worms found, was shown to be vastly lower than the percentage of those completely free from the invaders.

Richmond County, Virginia, where the war on the hookworm as a world-wide fight had its inception, stands out as an example of what may be accomplished and as an evidence that it can be accomplished with much less difficulty than was formerly supposed.

When the work began there, about thirteen years ago, 82 per cent of the people had the disease. A few years later a resurvey showed that this had been reduced to 35 per cent. A more recent resurvey reduced it to 2 per cent, and in 1922 it can be announced that there is not a single person in the entire county in whose body the worms are numerous enough to produce any of the symptoms of the malady.

THE WAYS OF THE NECATOR

There are two kinds of hookworms that invade the human body, an Old World species known as *Ancylostoma duodenale* and the "New World" form known as *Necator americanus*. The latter was described by Dr. Charles Wardell Stiles in 1902, and it was through his efforts that the South first came to realize the great drawback under which it had to labor as a result of the prevalence of the disease.

Some years ago specimens of the "American" species were found in Africa, and it is believed that it was imported to America with negroes, in the days of the African slave trade. It is interesting to note that the negro is far less susceptible to the disease than either the white man or the Indian, just as both the malaria and the yellow-fever mosquito show a preference for biting white folks. In British Honduras, in Barbados, and in other communities where large black populations live, the whites and the Indians are found to be much more susceptible to its attack than the negroes, both in the number of worms found and in the effect on the individual.

The New World species of hookworm is a small parasitic creature about as thick as an ordinary pin and half as long.

The adult female worm, inhabiting the small intestine, lays thousands of eggs daily. After these pass out of the body they hatch within one or two days. They are microscopic in size when hatched and never grow larger as long as they remain in the ground.

GETTING A "MOUTHHOLD"

Then comes along a pair of bare feet or hands, or some other part of the body touches the infected ground, and the little villains make the most of their opportunity. They promptly begin to bore their way through the skin, causing a severe irritation known as "ground itch." Once under the skin, they travel through the tissues until they come to the lymphatic system, and thence into the blood.

Finally, after passing through the heart and lungs, they reach the throat and pass thence through the stomach, ultimately landing in the small intestine, to whose wall they fasten themselves, and for as much as seven years, if not disturbed by treatment, take their fill of the victim's blood and intestinal tissue.

They develop in their salivary glands a substance that has a marked power of inhibiting coagulation of the blood. Attaching themselves to the surface of the intestinal wall, rasping and sucking away the delicate inner cells on which they feed, they lay bare the deeper tissues, and the wound continues to bleed for a long time, even after the worm has deserted the spot to which it was attached.

But they go even further than that. By some method not well understood, they cause the blood to undergo a change, reducing the amount of hemoglobin—the element that makes us red-blooded, and which constitutes the ingredient that tends to render healthy blood an unfertile soil for the seeds of infection sown there through lack of sanitation. It has been found that in severe cases of hookworm infection as much as 90 per cent of the red coloring matter of the blood is destroyed, and that the number of red corpuscles—the hod-carriers of the human system—may be cut down 50 per cent.

MASTERING THE MALARIA GERM

Even more insidious than the hookworm, and not so dramatically eradicable, is the microscopic animal that causes malaria. In the language of the lamented Osler, "cholera kills its thousands; plague, in its bad years, its hundreds of thousands; yellow fever, hookworm disease, pneumonia, and tuberculosis are all terribly destructive, some only in the tropics, others in more temperate regions as well; but malaria is to-day, as it were, a disease to which the word pandemic is applicable. In this country and in Europe its ravages have lessened enormously during the past century, but in the tropics it is everywhere present, the greatest single foe of the white man."

FOND OF CASTOR OIL

One of the dispensers in Ceylon administering a dose of castor oil before giving oil of chenopodium, in the treatment for hookworm infection. This photograph was labeled "A Thirsty Soul." Many of the natives are particularly fond of castor oil.

VISITING THE OUTPOSTS OF PUBLIC HEALTH IN CEYLON

HOOKWORM WARFARE IN CEYLON

The man to the physician's left is a "Kangany," who secures laborers for the estate on which he is employed and acts as foreman. He has brought his recruits to the dispensary for hookworm elimination. He knows it pays to have healthy workmen.

A ROW OF HOOKWORM VICTIMS IN CEYLON

All of these Tamil babies, some of them less than a year old, have the disease. No Old Man of the Sea ever rode his victim harder than do these intestinal leeches. The children who harbor them never attain a vigorous adulthood.

If yellow fever can point to pre-Columbian civilizations destroyed by it, and if hookworm disease can lay claim to being a strong factor in making backward that half of the world's people who dwell within the frostless latitudes, malaria can offer evidence that it has helped to make Africa the Dark Continent, that it was largely responsible for the passing of the "glory that was Greece and the grandeur that was Rome," and that today it lays a heavy hand upon the eight hundred millions of people who dwell within areas where it is endemic.

In India alone 1,300,000 people die annually of malaria and 100,000,000 more suffer from its attacks.

All over the world, wherever anopheline mosquitoes dwell, the "ague" is a menace which slays its thousands, renders the bodies of its tens of thousands happy hunting grounds for other pathogenic invaders, and makes its millions less efficient and useful.

It was Major Ronald Ross, the distinguished British army surgeon, who was finally able to pin the crime of spreading malaria on the anopheline mosquito.

Fourteen hundred years before Ross's day those winged villains were under suspicion, and the literature of the disease contains many unsupported charges against them. At length Laveran found the tiny eel-like parasite, which, swimming through the blood, attacks and breaks up the red corpuscles and causes malaria.

Then Ross undertook to find out how it got there. After discussing the subject with Sir Patrick Manson, he set out for his regimental post at Secunderabad, India.

He began to dissect mosquitoes under the microscope. Week after week he conducted his search for the malarial germ in the insect's tissues without result.

THE MOSQUITO THAT REVEALED THE SECRET

Finally, he had two remaining mosquitoes. Taking one of these, he searched it out part by part, but with intense disappointment, until he came to the "wee beastie's" stomach. There, with his high-power microscope, he found some black specks. He recognized them as the pigment of the malaria germ. After gaining this clue, exhausted, he slept for an hour. Coming back to his work, he used a stronger salt solution in his dissecting operations, and lo, the contents of the pigmented cells no longer consisted of clear fluid, but a multitude of thread-like bodies, which, on the rupture of the parent cell, were poured into the body-cavity of the insect!

From there they entered the salivary glands, and from these reached the blood of the person bitten by the mosquito. In his story of his work Ross exclaims: "Never in our dreams had we imagined so wonderful a tale as this."

Under his leadership, Ismailia, on the Suez Canal, with 8,000 population, set to

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A VIEW OF ANCON HOSPITAL, HOTEL TIVOLI, AND THE NORTHERN END OF PANAMA CITY FROM ANCON HILL, PANAMA

The yellow-fever mosquito, convicted in Cuba, secured a new trial at Panama, and came dangerously near to winning a verdict in its favor in the court of public opinion; but at last the methods employed in Havana proved effectual on the Isthmus and *Stegomyia fasciata* was sentenced by mankind to be perpetually branded as the conveyor of yellow-fever germs.

Photograph by Frederick Monsen

THE CITY OF HAVANA, CUBA, AS SEEN FROM THE HILLS BEYOND THE HARBOR

It was here that Colonel Gorgas, supported by General Wood, effectually applied the lessons of the Reed Commission's yellow-fever investigations and banished yellow fever from the island metropolis, thus marking a new day in municipal sanitation in the tropics.

Photograph by Richard B. Hoit

IN THE HARBOR OF GUAYAQUIL, ECUADOR

The resolution with which the Ecuadoreans attacked the yellow-fever situation and drove the disease from their shores has inspired other countries, from the Equator to the Rio Grande, with the result that yellow fever now has no ground it can call its own.

work to free itself from malaria. It succeeded so brilliantly that the disease was entirely wiped out.

Panama and a hundred other places have been largely freed from malaria by the application of the principles for its control developed by Ross and his coworkers.

In Italy, under Celli, the war against it brought down the number of deaths it caused from 28,000 in 1888 to less than 2,000 in 1910. In the district of Klang, in the Federated Malay States, Watson succeeded in reducing the number of hospital cases of malaria occurring annually from 334 in 1901 to 12 in 1906. In the Dutch East Indies the Department of Public Works at Sibolga succeeded, through its anti-malaria campaign, in driving down the annual mortality rate from 79 out of every thousand people in 1912 to 18 in 1920.

SIMPLE MEASURES REQUIRED

But preventive measures that will commend themselves to the communities that need them most must be at once extremely simple and very inexpensive—much more so than those employed at Panama and Suez.

The sanitarians who are striving to release the peoples of the earth from the merciless sway of malaria realize this, and many of them have joined forces for the formulation of a program for making any community safe against malaria. This has taken the form of large-scale, community-wide experiments in some of our own Southern States.

The anopheline mosquito is essentially a rural resident, in contrast to the yellow-fever carrier, which prefers an urban situation.

Therefore the malaria problem, in the main, has become, under conditions of modern sanitation, a matter to be dealt with mainly by small towns, villages, and country districts.

With this in mind, a group of villages and countrysides was selected where the various methods of combating the malady would be tested, in some places employing one method, in others another, and in still other communities a combination of two or three, or even of all known methods.

It was demonstrated in many towns and villages in Arkansas and Mississippi that from 75 to 95 per cent of the malaria in a community can be eradicated at an outlay of from 45 cents to $1.00 per capita. So successful were these demonstrations that in 1919 a conference composed of the United States Public Health authorities, members of State boards of health, the directors of the International Health Board, and local health officials decided to make concerted demonstrations in fifty-two towns in ten Southern States in 1920.

THE MOSQUITO BANISHED

The results were astonishing. At an average cost of 78 cents per capita, these fifty-two communities, which had been hot-beds of malarial infection, were largely freed from the disease.

Furthermore, by-products of the campaign were community pride, popular education in sanitation, and widespread interest in health problems.

The measures employed were: simple drainage, filling pits and shallow pools, channeling streams, clearing the margins of streams and ponds, removing obstructions, turning in the sunlight, oiling, enlisting the service of the top minnow, and administering quinine.

In Hinds County, Mississippi, in a countryside campaign, oil and the top minnow were used. They cut out 77 per cent of the cases of the disease at a per capita cost of $2.60 in 1919 and $3.09 in 1920.

The top minnow, *Gambusia affinis*, the female of which is two-thirds as large as a man's little finger, and the male half as big, proved to be such a wonderful annihilator of baby Anopheles that it is considered superior to oil in most cases.

These minnows have voracious appetites, and the baby mosquitoes are the *pièce de résistance* of their daily dinner. In some waters they are able to eliminate 90 per cent of all the malarial mosquitoes before these reach the flying age.

There are some waters where oil can be used to better advantage than top minnows, but in most cases the little fish are masters of the situation.

The fish are inefficient where the banks of the pond or stream are overgrown with vegetation. Here the pasturing of cattle

Photograph by T. Maler, courtesy Peabody Museum of Harvard University

MAYA RUINS AT PALENQUE, MEXICO

In pre-Columbian days the civilizations in Mexico and Central America reached a high state and then died out. Records recently translated show that terrible epidemics occurred. One affliction was known as the when-the-buzzards-entered-the-house disease—an eloquent portrayal of an epidemic so fatal that there were none left to bury the dead. Yellow fever or smallpox is believed to have been the malady thus described.

Photograph by Sumner W. Matteson

AZTEC RUINS NEAR MITLA, MEXICO

Mexico entered into the yellow-fever campaign last year and Brazil inaugurated vigorous warfare on the few remaining sources of infection in that country. These were the last lands where the disease existed. The ruins at Mitla are believed to be mute witnesses to civilizations conquered by the yellow-fever germ (see text, pages 326-327).

helps the situation. It opens up all the water area to the passage of the fish and the latter make the most of their opportunity.

IT COSTS ONLY ONE-FOURTH AS MUCH TO GET RID OF MALARIA AS TO KEEP IT

In six Arkansas towns where malaria control has continued for four years, it has been found that the cost of the disease to the community is four times as great as the cost of banishing it.

In Hamburg, Arkansas, the number of visits paid by doctors to malarial patients fell from 2,312 in 1916 to 59 in 1918 and to practically nothing in 1921.

It has been well known that the malarial parasite cannot live in the presence of quinine in the blood. Experiments on a large scale in Mississippi have demonstrated that ten grains of that drug a day for eight weeks kill the parasites in 90 per cent of the cases treated.

Under these large-scale demonstrations the world has had the way pointed out through which it may rid itself of one of humanity's greatest foes — an enemy which, unmastered, annually slays more victims than even the World War claimed in any twelve months.

In the world-wide crusade for the conquest of contagion inaugurated after the close of the World War, yellow fever stood out as an insolent foe that had been defeated in organized warfare, but that had now resorted to sniping and bushwhacking in tropical America and Africa.

How finally to drive it beyond the bounds of civilization and into the land of extinction became the thought of one of the world's leading sanitary organizations.

General William C. Gorgas, who had been the Nemesis of the Yellow Jack at Havana and Panama, was induced to head a board whose mission was to run down that disease to its lair and to stamp it out forever. It was while General Gorgas was en route to Africa, to extirpate the

Photograph by Alexander Stewart

A DENTIST AT WORK IN SHANTUNG PROVINCE, CHINA

No contribution that Western civilization can make to China can surpass that which it is making in establishing a medical school where health leaders can be trained.

sources of infection there, that he died in London, at a time when he might almost have realized his life's dream of "writing the last chapter of the history of yellow fever."

After Major Walter Reed and his fellow-workers in Cuba had demonstrated that yellow fever is a mosquito-borne disease, General Wood and Colonel Gorgas, by following the principles laid down by Reed, banished it from Cuba; Colonel Gorgas drove it out of Panama; Doctor Oswaldo Cruz eliminated it from Rio de Janeiro, and Doctor Liceaga exterminated it in Vera Cruz.

But there still remained a few places that served as seed-beds of the disease, against which the world had to quarantine constantly. One of these was Guayaquil, Ecuador, and there were others in Yucatan, Guatemala, and elsewhere.

Each time a person left one of these communities there was a "fifty-fifty" chance that he carried the possibilities of a big epidemic in his blood.

GUAYAQUIL THROWS OFF ITS CHAINS

Yet there was no way for the outside world to step in and throttle the disease in its endemic haunts unless invited by the governments in whose territories they existed.

Finally Guayaquil, awake to the new spirit of international coöperation for

TESTIMONIALS OF NATIVE PHYSICIANS IN CHENGTU, CHINA

making the world safe from the domination of the Huns of contagion, invited the foremost sanitarians of North America to coöperate with the municipality in a final drive for the extermination of the malady.

The invitation was accepted, and American, Latin, and Nipponese fought shoulder to shoulder in a stirring battle for the last stronghold of Yellow Jack, with the result that in less than a year's time the last case of yellow fever was cured; and in less than two years all danger of its recurrence was past.

For the first time in three-quarters of a century Guayaquil was a port against which the world no longer needed to set up the bars of quarantine.

Guayaquil's resolution to rid itself of the Old Man of the Sea of disease, that had sat astride its neck for the better part of a century, had another and a far-reaching result. The city's spirited cooperation made it possible to stage a thorough bacteriological campaign for the definite identification of the invisible foe that causes yellow fever, and, following its identification, to make a serum that would defeat the efforts of the microscopic creature to perpetuate itself.

Hitherto it had succeeded in eluding the most unrelenting quest for it. The bacteriologists knew that it passed from the blood of a yellow-fever patient into the bill of a female *Stegomyia* mosquito, thence into her stomach, where it was incubated, and thence again through her bill into the blood of a well person, where it multiplied and caused yellow fever.

But it was too elusive for microscopic or filter detection, and only through the finest work that had ever been done in a laboratory could science hope to find it.

The man selected for the task of discovering it was that Sherlock Holmes of Bacteriadom, Dr. Hideyo Noguchi, the eminent Japanese scientist, now a member of the staff of the Rockefeller Institute for Medical Research. He went to Guayaquil to coöperate with the local bacteriologists, and soon they were hot on the trail of the elusive little sniper.

Using a system of "dark-field illumination," whereby none of the direct rays of

A FIELD STATION IN PANAMA

The microscopist is here bringing ocular evidence to the populace of rural Panama that the hookworm is a real "beast," and demonstrating the process of releasing one's self from it.

VACCINATING AGAINST YELLOW FEVER

Once Dr. Noguchi isolated the yellow-fever germ, it was easy to make a serum against it. The anti-yellow-fever vaccine is almost as effective as the anti-typhoid serum.

light sent from the mirror to illuminate the object can reach the eye, but only the reflected rays that come from the illuminated specimen, he was able to peer very deep into the ghostly realms of the infinitesimal.

A LIVING GHOST IN GERMDOM

And there, in the droplets of blood from yellow-fever patients, he was able to detect a slim, shadowy, ghost-like, filamental, spiral wiggler, almost as eerie as a translucent phantom, twisting and rotating its corkscrew-like way through the blood.

He then tried to breed this "ghost" of germdom, for if he could do that he could be sure that his eyes had not played him false and caused him to imagine what was not. Having previously studied and cultivated its cousin, the germ of infectious jaundice, he was the more readily successful in providing it with an environment which, if not to its taste, was at least according to its necessities.

He found that he could grow colonies at will in culture tubes filled with the blood of human beings or of guinea pigs. He could start one colony from another, and then another from that, almost indefinitely, thus growing successive generations as definitely as we might grow successive crops of potatoes.

Not only so, but he found that from these cultures, as well as by the direct inoculation of the blood of a yellow-fever patient, he could produce yellow fever in guinea pigs, monkeys, and puppies. Even by an examination of the tissues of the animals taking the disease and a comparison of these tissues with those of yellow-fever victims he was able to show the identity of symptoms.

It therefore became so plain that no one could help seeing that the ghost of the "dark field" was in very truth a microscopic monster which, under normal conditions, does to death three out of every five people it attacks. Dr. Noguchi named it *Leptospira icteroides.*

SUCCESSFUL VACCINE AND SERUM EVOLVED

In his work Dr. Noguchi found that artificially cultivated yellow-fever germs, like those of many other diseases, lose a great deal of their virus-producing qualities, although they are still virile enough to hold their own in the blood against an invasion of more toxic newcomers.

With this fact in hand, he developed a serum for the treatment of the disease. Administered within the first four days of the patient's illness, it has, wherever tried, reduced the percentage of fatalities to a surprising degree.

Indeed, while three out of every five yellow-fever patients die where the serum treatment is not used, only one out of ten cases terminates fatally where it is used, the mortality rate being thus cut to one-sixth its former proportions.

But Noguchi did not stop with developing a serum. He also undertook to make a vaccine that would render those who used it immune from attack. Borrowing a page from the experience of those who made typhoid vaccine, he introduced killed cultures of *Leptospira icteroides* into the body. More than 8,000 people have been vaccinated, and, barring a few who took the disease before the vaccination had time to become effective, there has not been a single case among them, although there have been 700 cases in the same areas among the non-vaccinated.

Conservative beyond a layman's comprehension, Dr. Noguchi refused to claim that he had discovered the yellow-fever germ until he had opportunity to make further investigations and to check up his Guayaquil experiments in other fields. Since then he has gone to Yucatan and elsewhere, and all of the results he obtained at Guayaquil have been confirmed.

A VICTIM OF OVERSPECIALIZATION

It thus comes about that there are four ways by which yellow fever may be combatted—by eliminating Mrs. *Stegomyia fasciata,* the deadly lady of the mosquito tribe who carries it from person to person; by keeping persons with the disease out of reach of any chance survivors of the mosquito war; by vaccinating the non-immunes; and by administering serum to those who have gotten the disease in spite of all precautions.

So successful has been the combination of these methods that it is now believed *Leptospira icteroides* has come almost to the end of its rope. The hour of

Photograph by Charles Martin

A MOTHER WITH A SICK BABY CONSULTING A "MEDICINE MAN": PHILIPPINE ISLANDS

"There are many people on the earth who still believe that the snake is the only potent healer; more who still believe in the 'evil eye'; those who try to get rid of tuberculosis by swallowing a live frog; those who eat fox lungs to improve their 'wind'" (see text, page 330).

its extinction is thought about ready to strike, and, like the dinosaur, it will die out chiefly because it is a victim of over-specialization.

It is believed once to have been an inhabitant of the blood of various rodents; then some mosquito carried it from rodent to man, and it found its new environment so much to its taste that it refused to thrive in its old habitations any longer. It came to be wholly dependent on man for its habitat and on the mosquito for its transportation. Elimination of its vehicle of transportation means inevitably its extinction.

In the course of their work for the eradication of yellow fever, the sanitarians find that the employment of surface-swimming minnows is a better way of combatting the mosquito than the use of an oil film on the surface of the water, because less expensive and more constant.

Hardy, multiplying rapidly, and always seemingly as hungry as wolves, these minnows are able to control the mosquito situation in 85 per cent of the waters in which they are introduced.

In 1919 a big epidemic of yellow fever, with more than 3,000 cases, broke out in northern Peru. The lessons learned at Guayaquil were applied to check it. The little top-minnow was put to work and proved an amazingly valuable ally in banishing the disease from the region.

WHEN-THE-BUZZARDS-ENTERED-THE-HOUSE DISEASE

It has been advanced as a theory by students of Central American archeology that yellow fever was responsible for the fall of the highly developed Maya civilization, and that the majestic ruins at Mitla, Palenque, Chichen Itza, Petén, Quirigua, and elsewhere, from Yucatan to Honduras, are eloquent testimonials of

the uncontrolled power of yellow fever. In their records, for which dates appear to be fixed definitely as far back as the beginning of the Christian Era, the peoples of those times have left evidences of the horrors of yellow-fever epidemics. In their inscriptions they show the disease to have been one in which the patient vomits blood. They called the malady *oc-nat-chucil,* meaning the "when-the-buzzards-entered-the-house" disease.

When we remember that, even with modern methods of treatment, three out of every five people attacked die, and that in Maya days the treatment consisted of magic instead of medicine, we can very well see how deaths were so numerous and illness so general that the dead could not be buried.

And so it has come to pass that sanitary science is able to hold out to humanity a charter of freedom from three of the greatest scourges that have beset mankind. Nations are beginning to follow the splendid standard raised by Great Britain a half century ago which bears the inscription, "The people's health is the supreme law."

In the Philippines, in Porto Rico, the gospel of good health is America's foremost contribution to the inhabitants' welfare. The United States Government has untiringly sought to cut down the death rate in our dependencies. Throughout the British Empire, in Africa, in India, in tropic seas, British sanitarians have carried the glad tidings of better health. In Indo-China, in Madagascar, French sanitarians, through the Institute of Colonial Medicine, have labored with stirring success to prevent sickness and circumvent death. In Formosa, Japan has shown how high death rates may be cut down and well-being promoted, even among illiterates.

Gradually all the microscopic monsters that have challenged man's dominion on the earth are being circumvented. Before the days of Jenner, smallpox was the popular disease, as unescapable as measles and whooping cough now. Men are still living who remember when typhus was one of the great scourges of our cities, and who recall the time when a full fifth of the doctors of Ireland died from the disease.

But after all that Western civilization has done for the release of humanity from the terrible scourges that in the past have decimated mankind, there still remains that wonderful one-fifth of the human race we know as China, all but helpless before the onslaught of contagion's spread.

Commerce, as has been well said, carries dangerous infections as well as goods and ideas; but China has struggled to combat them with agencies as antiquated as the oxcart and the pony express. The consequence has been that this country has the world's highest death rate, estimated at as much as 40 per thousand, or thirteen million a year.

To reduce this terrible toll by bringing the gospel of modern medicine and sanitation to the vast hordes of people of Chinese blood, American altruism has thrown a king's ransom into the work of medical education in that country.

Here and there influences were at work for the bringing of the blessings of modern medical knowledge to the great Asiatic republic. Missionary societies had labored valiantly against overwhelming odds. Christian missionary societies had supported 317 hospitals, besides many dispensaries.

In addition, there were some medical schools maintained by the central and provincial governments, with teaching staffs recruited from students of some of the institutions of Japan. A few rather weak schools were maintained by the missionary activities of America. But all together they constituted only a drop in the bucket compared to China's needs.

"THE GREEN CITY OF PEKING"

To-day, thanks to American friendship for and faith in China, the "Green City of Peking" is an accomplished fact. A great medical university, with its faculty recruited from the best institutions of the West, has thrown open its doors, its major aim being to develop in China an adequate corps of trained Chinese physicians and nurses and to establish thoroughly equipped hospitals.

That university is the Peking Union Medical College. The construction of fifteen buildings was a sight that interested "young China" very much. The making of uniform sash, door, and window-

A HINDU TEMPLE IN THE FIJI ISLANDS AND ITS PRIEST, WHO HAS BECOME AN APOSTLE OF DISEASE PREVENTION

frames, with modern wood-working machinery, naturally amazed a people accustomed to handwork whose common translation of "identical" is "not very different."

The institution consists of anatomical, physiological, chemical, and pathological laboratories, a 250-bed hospital, etc. The trustees are chosen by the China Medical Board in coöperation with six missionary societies.

It is expected that the nurses trained here will be women, even for the men's wards. This is an innovation, as China has never had women nurses for men patients. The change will be made cautiously and gradually. Women will be encouraged to enter the school for the study of medicine.

In addition to the Peking Union Medical College, funds are annually appropriated for the improvement of hospitals throughout the country, with a view to providing suitable facilities for the doctors turned out by the medical school, and furnishing a demonstration to the people at large of the benefits of modern medical science.

With that spirit of progress which seems destined to mold China into one of the future's chief nations, the government and the people have heartily welcomed this new evidence of American friendship and faith. Cordial relations are maintained with the Chinese leaders working in the same fields of medicine and hygiene.

The yearly deaths in China now number around 13,000,000. If the death rate that obtains in the United States came to apply in that country, the annual death roll would reach only 4,550,000.

Think of a possible saving of more than eight million lives a year! Think of rescuing annually as many people from untimely graves as live in Argentina or Canada, more than live in Belgium, Australia, or Sweden! Was there ever such a challenge to altruism and science as that?

Although the plan of campaign that ultimately will eliminate the world's major contagions has been well mapped out, the officers' training camps, in which the men who are to captain the forces of health in the great drive, have been far from adequate. From all parts of the world are coming appeals for trained sanitarians.

To meet this condition Johns Hopkins University has established a School of Public Health and Hygiene. Harvard has enlarged its work along similar lines. Columbia has expanded its medical activities, and all the health agencies of the United States are coöperating in the creation of a proper course of instruction in public health leadership.

In Canada six medical schools have enlarged their work; in Belgium the Queen Elizabeth Foundation for Medical Research has been established; in Brazil the Medical School at São Paulo has added hygiene and public health to its curriculum.

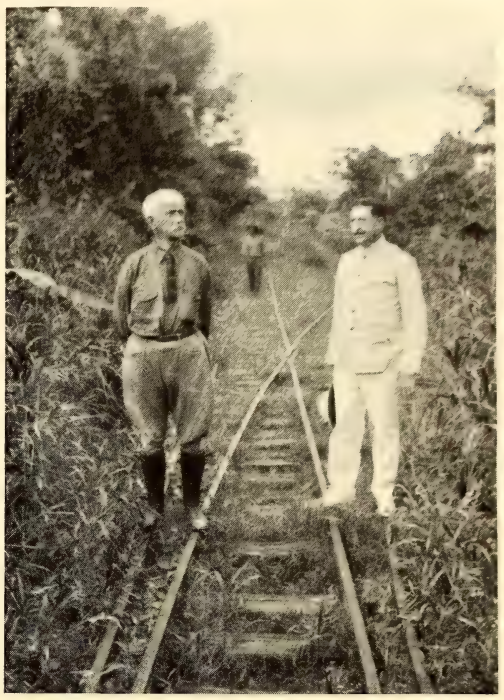
In England five million dollars has been pledged to the University of London and

the University College Hospital for the creation of a modern health center in London.

Thus it is soon to come about that adequately trained public health leaders will be available to officer the health armies that will never relent until the autocracy of contagion is laid low.

And what a field for work they have! Among the most backward half of the earth's population the annual death rate ranges between 30 and 40 per thousand. Among the most progressive fifth it ranges from 15 down to 10 per thousand. The average is around twenty-six.

Whether there shall be upward of forty million people dying every year, as at present, or whether this tremendous death toll shall be reduced to less than twenty million, which is what experience in progressive states shows to be an attainable goal, depends mainly on the work of sanitarians who would end the sway of contagion throughout the earth.



GENERAL GORGAS (AT THE LEFT) IN A GUATEMALAN JUNGLE

OPENING THE TROPICS TO THE CAUCASIAN

There is another aspect to the international health situation that challenges attention.

The most productive half of the earth's surface lies within parallels of latitude where contagion is most rampant. As humanity expands it must look more and more to the tropics for its food.

How fast mankind is expanding few people realize. Mulhall and other statisticians tell us that the population of the earth was 650,000,000 when Napoleon had himself proclaimed Emperor, as compared with 1,625,000,000 when the World War began. In other words, the population of the earth expanded two and a half times as much from 1804 to 1914 as it had from the days of Adam to those of Napoleon.

With a heavy rainfall to take the place of irrigation, with rich soils, with abundant and intense sunshine, the tropics have food-producing potentialities that beggar description.

And sanitation has proven its power to break the domination of the white man's principal foes there—disease germs.

The achievements of sanitary science in promoting the well-being of humanity, where it has been applied, tax belief. The natural opportunities for contagion to travel to the ends of the earth on the wings of humanity's commerce are legion. A thousand ships sail the seven seas now, where one crossed them four hundred years ago. Ten thousand persons travel by train and automobile now, where one journeyed by caravan in the days before sanitation's rise.

But even in those days, when the human race didn't go beyond its own neighborhood as much in a quarter of a century as present-day civilization does in one week, and when the world had less than one-fifth as many people as it now has—even then all nations were frequently prostrated by epidemics—terrible, calamitous scourges that filled whole continents with weeping and lamentation.

Resistance was useless, for no one knew how to resist. All that could be done was for the sick to bury the dead, and wait disconsolately for the day when the fires of infection would burn themselves out because there was no more fuel.

In a single epidemic of black plague, China alone lost enough of its population

"TWENTY-TWO MILES TO TUPELO"

Congress established a fish hatchery at Tupelo after its Representative in Congress had proved that place to be the center of the universe, on the ground that there the horizon was equidistant everywhere. To-day Lee County, Mississippi, of which Tupelo is the county seat, proclaims that man has no gizzard.

to fill five rows of graves reaching around the earth. Spreading to Europe, this same epidemic found enough victims to replace every casualty in the World War.

But this was no isolated calamity. Now cholera, now smallpox, again the plague, now influenza, starting mayhap in the Orient, would follow the caravans to India, then journey with the religious pilgrims to Mecca, and then scatter to the four corners of Europe, overwhelming the Continent as irresistibly as a mighty flood. Millions of graves, millions of pauperized survivors, millions of desolate homes followed every invasion.

If such results grew out of the wanderings of a few traders and the journeyings of a few religious pilgrims, what would happen to-day were it not that sanitary science has erected barriers everywhere for our protection?

To see the death rate of progressive communities reduced to 10 per thousand, in the face of such a vast increase in intercommunity and international intercourse; to see the average life span in America lengthening from 31 to 40 years within four decades—mainly through the work of the sanitarian—is, to those who reflect, a wonderful earnest of the victories of sanitation that are destined to be won in the years that lie immediately ahead.

WHERE IGNORANCE REIGNED

There are many people on the earth who still believe that the snake is the only potent healer; more who still believe in the "evil eye"; those who try to get rid of tuberculosis by swallowing a live frog; those who eat fox lungs to improve their "wind"; those who essay to cure epilepsy by having the patient wear the unwashed shirt of one who died of that malady; some who recommend the curing of goiter by drawing a live snake nine times across the thyroid glands, and whooping cough by feeding the patient boiled mouse meat. Others believe that by rubbing their jaws where hogs rub theirs they will escape the mumps.

It is only a few centuries since people contended that the brain was a sponge to keep the heart cool; since Harvey was denounced for saying the heart was the engine that drives the blood through the body. In the days of our great-grandfathers, people said smallpox vaccination made girls cow-faced, and caused boys to bellow like bulls. Even within the memory of living men, the use of anesthetics was denounced as the work of the Devil, by otherwise sensible people.

But to-day, with the number of deaths cut in half wherever the sanitarian holds sway, with the average life lengthened eight or nine years where his advice is lived out, preventive medicine has been vindicated a thousand fold, and the outlook for the future is such as must hearten every thoughtful person and arouse the hope that the grip of the tyrant of contagion on the peoples of the earth is destined to be broken, and that as the generations come and go the science of eugenics and the science of preventive medicine will work hand in hand for the development and maintenance of a better race, inspired by nobler ideals and moving on to a richer destiny.

Vol. XLII, No. 4 WASHINGTON October, 1922

THE NATIONAL GEOGRAPHIC MAGAZINE

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TRANSPORTING A NAVY THROUGH THE JUNGLES OF AFRICA IN WAR TIME

By Frank J. Magee, R. N. V. R.

With Illustrations from Photographs by the Author

No single achievement during the World War was distinguished by more bizarre features than the successfully executed undertaking of 28 daring men who transported a "ready-made" navy overland through the wilds of Africa to destroy an enemy flotilla in control of Lake Tanganyika. With the conflict in Europe as the motive background, one of the participants and directors in this amazing adventure recites in his own way here the incidents of a jungle journey which has no counterpart in the history of African exploration.—The Editor.

EARLY in the summer of 1915 J. R. Lee arrived in England from Africa and laid a plan before the authorities that were in session at the British Admiralty.

He proposed that the government send, by an overland route across Africa, two small boats to the assistance of the Belgian forces on Lake Tanganyika. Lee, having lived in Africa for some years and possessing an intimate knowledge of its geography, offered to act as guide.

At first the authorities were inclined to pass over the proposal, so highly impossible did it appear; but a special conference was called at the Admiralty, and after the project had been weighed it was decided that a small expedition should be sent. A forlorn hope, surely. But what were the lives of a handful of men thrown in the balance against what might be achieved?

The task of organizing the Naval Africa Expedition, as it was called, was entrusted to Commander Spicer Simson, R. N., who was given a free hand in the selection of officers and men, 28 all told. He was allowed to choose his crew from any branch of the service. J. R. Lee was given the rank of lieutenant, and other officers with a knowledge of bush life and transport were chosen. A doctor specially skilled in the treatment of tropical diseases, and navy gunners with exceptional gunnery records, were also selected.

THE SMALLEST EXPEDITION AGAINST THE ENEMY DURING THE WAR

This expedition was the smallest sent against the enemy during the war, and, with the exception of the commander, all its members were volunteers. We carried no passengers, all officers and men being specialists in their particular lines.

It was important that no news of the departure or object of the expedition should leak out and get to the enemy. Consequently, officers and men were put on their honor not to divulge, even to their nearest and dearest, where they were bound nor what was their mission.

Two boats were selected, tried, and found suitable. They were 40-foot motor-boats, with 8-foot beams, capable of doing 18 knots.

HOISTING THE NAVAL AFRICA EXPEDITION'S UNION JACK IN THE FIRST CAMP AT FUNGURUME

Fungurume, 100 miles beyond Elizabethville, was the railhead in Cecil Rhodes' "Cape-to-Cairo" project in 1915. Here the expedition detrained the boats and started its grueling journey through the heart of the Dark Continent. During the last seven years the line has been extended to Sankisia (see K-11, Map of Africa Supplement)

While preparations were being pushed in England, Lieutenant Lee and I left for Africa on May 22, 1915, going ahead of the main body to select a route across the African bush from the point where the boats would be taken off the train.

It was important that a route as free as possible from hills, gorges, etc., yet close to water, should be chosen, as our boats were to be taken over this trail intact, each drawn by a traction engine.

Great difficulty was experienced in finding a suitable route over which to make our road, owing to the hilly nature of the country, as well as to the long stretches of marshland, the breeding ground of malaria-carrying mosquitoes. But at last a route was selected and thousands of natives were recruited from the adjacent villages and set to work under white supervision literally to carve a passage through the bush.

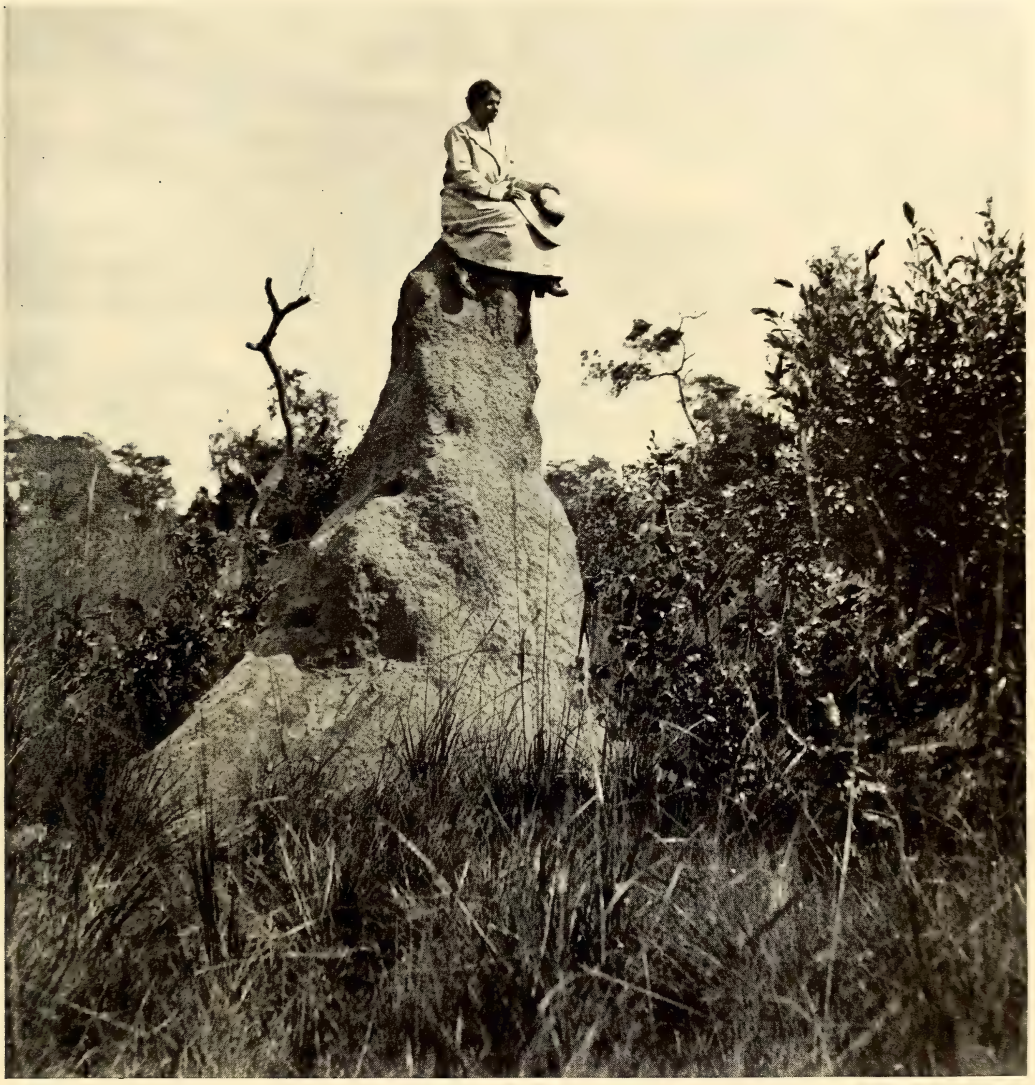
Where slopes were too steep they were leveled down. Bridges, constructed from timber growing on the spot, were thrown across river beds. Giant trees, when blocking our path, were uprooted with dynamite. Rocks and boulders were treated in a similar manner.

CARVING A 146-MILE ROAD THROUGH AFRICAN BUSH

Our biggest problem was a dried-up gorge, 40 yards wide and about 20 yards deep. This we filled up completely with tree trunks.

Thousands of trees were cleared out of the way. The enormity of this task may be appreciated better by the reader when he learns that so dense was the growth of the bush in some sections of the route that it was possible to travel for several days at a time and get only an occasional glimpse of the sky through the tangled foliage overhead. So the 146-mile roadway was pushed ahead, making, as it progressed, an unavoidable climb over a plateau 6,000 feet above sea-level.

But to return to our main party and the



WHITE ANT-HILL NEAR ELIZABETHVILLE, BELGIAN CONGO

White ants, or termites, are the bane of Central Africa. Their clay hills, some of which are 40 feet high, dot many regions. They cut through leather and wood and eat away the floors and wooden supports of houses. Thousands often sally forth to make a concerted attack on an enemy or to take possession of a human habitation.

motor-boats, *Mimi* and *Tou-Tou*. They left England on the steamship *Llanstephan Castle* on June 12, 1915, for Cape Town. The motor-boats were stowed on deck in specially constructed cradles. At Cape Town they were transferred to railway trucks, and after a journey of 2,488 miles they arrived at Elizabethville, in the Belgian Congo. (See Map of Africa, K-12, issued as a supplement with this number of THE GEOGRAPHIC.) Here the expedition remained a few days, making final arrangements for its trek across country.

The members of the expedition were fêted by the Belgian populace, who, however, were not a bit optimistic about the outcome of our efforts to reach the lake. Among the sporting fraternity of this township the betting against our getting through was 100 to 1. However, "It's dogged as does it" was our watchword,

NATIVE PASTOR CONDUCTING RELIGIOUS SERVICE IN A KRAAL: ELIZABETHVILLE, BELGIAN CONGO

Elizabethville is the boom town of the Congo. Before the advent of the railroad, in 1910, it was a "geographical expression" in the jungle, dominated by huge ant-hills. Now it is the center of the Katanga District copper industry and knows such comforts as ice, bath-tubs, running water, tennis courts, golf links, and electric lights. Belgian missionaries have labored to civilize its 12,000 native inhabitants and have also taught them various useful trades.

and we left the Belgian town full of hope and bearing the good wishes of the townsfolk, who turned out in force to see us off.

In the course of a few days we reached the railhead, and that is where the real business started. The depot was called Fungurume (midway between Chilongo and Kambove). Here the boats were detrained, still in their cradles, and mounted on specially constructed carriages fitted with rubber-tired wheels.

ALL SUPPLIES CARRIED ON HEADS OF NATIVES

In the meantime stores were being sent ahead by native carriers, each boy carrying on his head a load weighing about 60 pounds. Provisions, ammunition, and petrol for the motor-boats were all transported in this fashion, our string of native carriers extending in single file for miles. There being no coal in this country, we had to rely on wood chopped en route, stacks of which had been prepared in readiness by the advance party.

Writing of native carriers reminds me that it was customary for them to chant or sing as they jogged along. Some of those whose villages had been situated near white settlements had learned English hymns in the local mission homes. They had memorized the tune and words, but they had no comprehension of the actual meaning of the words. Imagine, therefore, a crowd of natives on the march, each carrying a load of some 60 pounds on his head, with a prospect of a 30-mile trek under a blazing sun, singing such a hymn as "Now the Laborer's Task Is O'er."

About this time we lost our guide and the originator of the expedition, Lieutenant Lee, sunstroke and fever obliging him to go to the hospital.

By about the middle of August the expedition made a start, with boats and all gear, from Fungurume on the 146-mile journey through the bush, escorted by an armed guard of Askaris (native Belgian soldiers).

A detachment with a powerful motor lorry, carrying a supply of provisions, tents, and general camp gear, went ahead to select a suitable spot for camping each evening, to erect tents, and to prepare food for the main body following.

And so, early in the coolness of an African morning, we turned our backs on civilization and all that it meant, to fade away, but for a short time, we hoped, into the heart of the African bush.

However, "coming events cast their shadows before," and shortly after we got on the move we had a taste of what was in store for us in the way of trouble. Within one hour of leaving Fungurume the wheels of the leading traction engine became embedded in the earthwork and timber of a ford across a small stream, the strength of the ford being insufficient to stand the weight of the engine. Thus two precious days were wasted in getting the engine out of difficulties.

I say "precious" days because the rainy season was not far off, and it must be remembered that, once the rainy season starts in Central Africa, it rains for weeks almost without a break, in solid sheets of water. Small streams become swollen torrents, carrying everything before their mad rush; lower levels become enormous shallow lakes, and all roads and tracks are obliterated.

In addition to this, one good rainfall would render useless our stacks of wood fuel all along the route.

Getting on the move again, we reached Mofia, 14 miles distant. This was not a bad day's work, considering the difficulties. From this point to the native village of Wendi Macosi the roads were fairly good.

TRACTION ENGINES CAUSE CONSTERNATION AMONG NATIVES

Needless to say, the arrival of two iron monsters in the form of our tractors, belching forth smoke, caused considerable consternation among the natives of this village. They deserted their homes and fled to the bush. But when the chief and his headmen were assured that the engines were harmless, the natives returned to their village, and soon came to us, bringing offerings of fruit, vegetables, chickens, and goats.

This happened in most of the villages we passed through, but now and then we encountered a tribe not too kindly disposed toward white people. We carried an ample supply of tinned foods; but fresh meat being preferable, we obtained

WHERE THE REAL WORK BEGAN

At Fungurume, the end of the railway and valley gateway to the central African bush, the expedition's boats were unloaded, still in their traveling cradles, and mounted on rubber-tired carriages. Then began an incredibly laborious trek under a blazing sun. Supplies were forwarded in advance by an army of native carriers.

all we wanted for both the members of the expedition and our hordes of native carriers from enormous herds of buck met with from time to time. Wild pig and guinea-fowl were also plentiful and provided satisfactory rations.

In a sense, the native chiefs were rather disappointing to the eye. Generally, one looked in vain for the flowing head-dress of gorgeous feathers and the leopard skin slung from brawny shoulders. They were for the most part attired in—well, nothing to speak of, except in the case of native personages.

SPATS, OPERA HAT, AND PINK SUNSHADE PART OF NATIVE CHIEF'S UNIFORM

The prevailing mode among these petty potentates seemed to be obsolete uniforms of all armies. One old chief, I remember, was attired in an old British militia tunic and a pair of spats, his crowning glories being an opera hat and a pink sunshade. I was aware that a big business in out-of-date uniforms is carried on between traders and these tribes, but the origin of the spats and pink sunshade puzzled me somewhat until I remembered we were in the land of reputed cannibals.

After leaving Wendi Macosi we struck some bad spots, but all members of the expedition put their backs into the work, hauling on ropes, bringing in wood, and patching up holes in the road. In fact, they did their best on all occasions, and nothing went amiss.

A fine example was set by the commander. He went around encouraging his officers and men with a kindly word (and sometimes a curse), and so got things done. Thus, under the pitiless glare of a tropical sun, the race against the coming rains went on.

One of our greatest handicaps was lack of water, both for drinking purposes and for the engines. Often for days at a time we went without a wash in order that the engines might have their fill. This may appear to have been no great hardship, but in the tropics a bath is a tonic and means a great deal. On some occasions, too, the water was so muddy that it had

CARVING A PASSAGE THROUGH THE AFRICAN BUSH: BRIDGE-BUILDING

Blistered by the glare of a tropical sun and tortured by insect pests, the expedition doggedly hewed a 146-mile road over hill and through valley, across river and stream. Slopes too steep to climb were leveled; bridges, constructed of timber growing on the spot, were thrown across river beds; gorges were filled in with trunks of trees, and rocks, boulders, and giant trees were dynamited to clear a path.

to be strained through mosquito netting before it was fit to drink.

Once the engines ran dry. This was a serious matter, and native women from local villages were commandeered to fetch water. They carried it in gourds and jars on their heads from a water-hole eight miles away, and had to make the journey several times before a sufficient supply was procured.

That the gentle susceptibilities of white folk may not be unnecessarily aroused by the fact that the native women were "rounded up" to fetch water, it may be said that the work in this country is done by the women of the native villages, while the men loaf—sad yet true.

Onward and upward to the top of the plateau the struggle continued, day and night, the noise of our engines rudely disturbing the slumbers of herds of elephants and other denizens of the bush, and driving them from their lairs.

BOATS HAULED UPHILL WITH CABLES, A DANGEROUS METHOD

So steep were some of the slopes that "double banking" had to be resorted to. That is to say, owing to one tractor's being incapable of hauling its load of one boat, the two engines were hitched to one boat. Afterwards both would return to bring up the second boat.

Another method used, when the road was too steep and soft for the tractor's wheels to get a grip, was by "cabling." The engine would leave its load at the foot of the hill and climb to the top, where a hole would be dug large enough to take the tractor. One end of a wire

TRACTION ENGINE AND BOAT CROSSING A RIVER

In the race through the jungle against the coming equatorial downpours, much time was lost at river fords. Many of them were not strong enough to sustain a heavy weight, and either gave way altogether or embedded the wheels of the traction engine in their earthwork and timber. Haste was imperative, for the African rainy season lasts for weeks, sweeps away bridges and fords, and turns lower levels into enormous tracts of lake land. Note the tarpaulin covers used in an unsuccessful effort to prevent the boats from warping under the equatorial sun (see text, page 345).

BRINGING UP WATER FOR THE TRACTION ENGINES

The lack of water was the expedition's most serious handicap, the men frequently sacrificing their drinking and washing supply for the thirsty boilers. On one occasion native women were rounded up to fetch a supply from a water-hole eight miles away. They carried it in heavy jars on their heads and thought nothing of making the trip several times. This being a form of "housework," the native men refused to help.

LOWERING ONE OF THE BOATS DOWN A STEEP GRADE

The downward trek from the 6,400-foot plateau provided plenty of work. One end of a wire hawser was attached to the boat to be lowered, the other to the traction engine. Extreme care had to be exercised as the boats went over the bank, for a broken hawser meant destruction to the boat. (The traction engine, at one end of the hawser, was out of range of the camera.)

hawser would then be fastened to the boat carriage at the foot of the hill, the other end being fastened to the drum on the traction engine. The drum would be made to revolve, thereby drawing the boat to the top of the slope, the tractor remaining stationary and the hawser coiling on the drum.

This method was, of course, fraught with risk, as the snapping of a hawser would mean destruction to the boats.

FORTY-TWO TREK OXEN REPLACE TRACTION ENGINES

When we neared the top of the plateau the nature of the formation of the road made cabling and double banking impossible; cabling, because of the turns in the route, and double banking, because the road was too narrow for the engine to return.

Trek oxen and a block and tackle were therefore brought into use. We had three "span," 42 animals in all (14 to a "span"). Oxen are, of necessity, slow, but of paramount value in pulling great burdens on straight roads, and we got over the turns by the following method:

A stout tree was selected about 20 yards ahead of the spot where the boat stood on its carriage in the trail. A block and tackle—that is, a pulley block with rollers, such as is used aboard any ship—was fixed to the tree. One end of the rope was attached to the boat carriage, the other end passed through the pulley block and attached by a cross-bar to the rearmost pair of oxen. The oxen faced downhill, in the opposite direction from and parallel with the boat.

All being ready, the native drivers then began laying their long whips on the oxen. The animals strained at the rope, and slowly, bit by bit, the boat was drawn up the hill until almost level with the tree to which the block and tackle were secured. The wheels of the boat carriage were then chocked up, the block and tackle fastened to a tree farther up the hill, and the whole performance repeated.

Thus by a series of tugs and jerks, accompanied by the cracking of many whips, the gradient was negotiated. The road then becoming straighter, the block and tackle were dispensed with and the oxen actually harnessed to the boats.

BIG TREE SAVES WILD ENGINE FROM A PRECIPICE

Farther on, the road once more became sufficiently hard for the tractors, and after some heavy work we reached the top of the plateau, 6,400 feet above sea-level, on September 8, 1915.

This, however, did not mean that our difficulties were at an end. The downward trek from the plateau provided plenty of hard work and many thrills, a great deal of cabling being done in easing the boats down steep slopes. On one occasion a traction engine got out of control going down a hill, fortunately running into a huge tree, which prevented it from going over an almost perpendicular bluff several hundred feet high. Again one of the boats slewed across a bridge and stopped only a few feet from the edge, narrowly escaping a fall into the river beneath.

Bush fires annoyed us a good deal, and we frequently had to make a hurried shift to avoid being burnt out.

Progress now became painfully slow, indeed. Some days we hardly covered a mile, although traveling from 5 o'clock in the morning, through the heat of the day, until 9 o'clock in the evening. The king of the bush, the African lion, showed his resentment of our intrusion upon his domain by long, loud roars during the night, but the glare from the campfire held him at a safe distance.

NATIVE VILLAGES WIPED OUT BY SLEEPING SICKNESS

A part of our route lay through the areas infested by the tsetse-fly, the carrier of the dread African scourge, sleeping sickness. From time to time we passed through deserted native villages, the inhabitants of which had long been wiped out by this ravaging disease.

Although all of us were badly bitten by tsetse-flies, none suffered any ill consequences, except by the discomfort and pain caused by the bite. It is like the prick of a red-hot needle. The flies can bite through clothing quite easily, and actually have to be knocked off, it being impossible to shake them clear.

OXEN HAULING THE BOATS TO THE TOP OF A HILL

The expedition's 42 oxen were useless in pulling a heavy burden except on a straight road. Even then it was a laborious process, with much cracking of long whips by the natives and straining and puffing of the animals.

As far as possible every precaution was taken to ensure a good bill of health. Water was always boiled and filtered, and each of us took a good dose of quinine each evening to stave off malarial fever. Light khaki clothing and tropical sun helmets were worn by all white men.

The doctor had a far busier time treating natives and their children than attending to members of the expedition. When they heard of the "Great Medicine Chief," the natives flocked from their villages, bringing their sick and lame with them. But the doctor could attend to only a few, as his supply of hospital requisites was limited.

I will not go into any more details of that memorable bush trek. After long days of toil and many qualms as to whether our destination would ever be attained, we eventually reached Sankisia, a railway depot about 18 miles from the river Lualaba, on September 28, 1915,

NATIVE BOYS BRINGING IN BUCKS FOR DINNER

It is a simple matter to step out into the teeming jungles or prairies of Africa and obtain an unlimited supply of game for food. The ordinary diet of the native consists of a manioc or cassava flour made into a paste, and a meat stew concocted of everything, from ants and grasshoppers up to man. Indeed, "food that once talked" is a special delicacy, though indulged in but secretly and rarely nowadays.

having taken approximately six weeks to cover the bush journey of 146 miles. [The railroad from Chilongo to Sankisia, shown on the accompanying Map of Africa, had not been completed when this expedition was undertaken.]

BOATS LAUNCHED BY HAND FOR 350-MILE RIVER TRIP

Needless to say, all of us breathed a prayer of thankfulness and relief, but realized we still had many miles to cover before reaching Tanganyika. Three or four days were spent here in transferring the boats to the train for the 18-mile run to the river at Bukama, which we reached without further adventure.

At Bukama a camp was established while the work of launching the *Mimi* and *Tou-Tou* went ahead. They were simply man-handled, no cranes or hoists being available. Iron rails were laid from the trucks to the riverside, down which the boats were gradually lowered broadside in their cradles into the river. The cradles were then knocked away and the boats floated clear.

It was now found that, owing to the

BUTCHERING AN ELEPHANT FOR A NATIVE FEAST

The native method of elephant-hunting is to drive the beast into a huge pit, especially dug and covered with branches and grass, where it is killed with spear thrusts or poisoned arrows. As fast as a section of the hide is stripped, it is rubbed with salt and rolled up.

TOMMY ATKINS TAKES HIS TEA IN THE HEART OF THE JUNGLE

When the inland villagers overcame their consternation at the sight of two traction monsters belching forth fire and smoke, they became very friendly and brought the expedition offerings of fruit, vegetables, chickens, and goats. The white dress of the African tea-pourer is indicative of the influence of a mission station.

intense heat encountered throughout the bush journey, the wood had warped and seams had opened in part, although the boats had been covered with canvas tarpaulins. This necessitated taking out the engines, caulking the seams, and submerging the boats, which then resumed their normal seaworthy condition. Our stores and camp kits were transferred to a fleet of large native canoes, carved from huge tree trunks and propelled by native paddlers.

As the river had not been charted for some years, it was not considered wise by the commander to allow the *Mimi* and *Tou-Tou* to proceed under their own power, more especially as this was the end of the dry season. There was very little depth in some places in the river, and there was always danger of running upon hidden rocks or sand banks. To minimize this risk and to increase the buoyancy of the boats, large iron petrol drums were fixed to the keel of each boat.

THE AUTHOR WITH THE EXPEDITION'S MASCOT

When this African pickaninny grows up, he will be decorated with large raised scars on his back and chest to show to what tribe he belongs.

TRIALS OF NAVIGATION ON A CENTRAL AFRICAN RIVER

All being in readiness, finally we started off on our 350-mile voyage down the river, every one looking forward to a much-needed and welcome rest after our exertions ashore. But our hopes received rather a sudden shock. Within a few hours after starting, both the *Mimi* and *Tou-Tou* ran up hard and fast on a sand bank.

Fortunately, both boats being towed by a flat-bottomed barge paddled by natives, and therefore traveling at reduced speed, no damage was sustained, but the accident caused considerable delay. All portable gear had to be transferred from the leading boat to the rear one. This considerably lightened the forward boat and, with the aid of the native paddlers, who got into the water and heaved with all their strength, we managed to shift it inch by inch until it floated free.

All gear was placed aboard the floating boat and the second one treated in a similar manner. This same trouble happened constantly—no less than eight times in one day, I recall—until we struck deeper water.

JOSEPHINE BREAKFASTING WITH AN OFFICER

This baby chimpanzee was the pet of the expedition. She was quite tame, and romped with the camp's chickens, dogs, goats, and a kitten. She liked to eat with a spoon and cried like a baby if left alone.

This "pleasant voyage" was a grueling business. We were baked alive during the day, and tormented at night by all the flying pests of the Congo—mosquitoes, flying beetles, flying ants, and their innumerable relatives. We camped ashore every night and always made an effort to get our evening meal over before darkness set in, for the candles attracted such hordes of flying things that eating was impossible. A plate of soup, a few minutes after being placed on the table, became a seething mass of floundering insect life.

Farther down the river we encountered deeper water and under such conditions managed to cover 20 miles in a day.

We proceeded under the power of native crews, who swung their long paddles to a chant which, although pleasing to the ear for a while, became extremely monotonous after a few days, because the melody never varied. The native paddler who can paddle without chanting has yet to be found; it seems part and parcel of his business.

Luxuriant trees, high grass, waving ferns, and stately palms fringed the river banks for miles at a stretch, breaking occasionally to reveal acres and acres of rolling prairie, the feeding ground for herds of eland, roan, and numerous varieties of buck. Here, also, were to be found elephants, rhinoceroses, lions, and buffaloes in large numbers; they would stand and watch us curiously as we passed, scattering and disappearing as soon as a shot was fired.

CURIOUS RIVER CITIZENS

Stretches of the river were simply alive with crocodiles—enormous creatures, most of them. Some lay along the shore, on the hot sand, sunning themselves, while others floated lazily near the surface, their ugly snouts showing just a few inches above the water. They were difficult targets for our rifles, but

we accounted for a good number; in fact, we got tired of shooting them, unless they were wanted as meat for our natives.

We came across hippopotami, too, in large numbers. They offer good targets, but can become exceedingly dangerous, with their playful way of suddenly rising under one's canoe and crushing it with their powerful jaws.

On October 11 the expedition reached Lake Kisali, the home of thousands of birds of different species, including marabou, fish-eagles, spur-winged geese, and many other varieties.

Kadja, a Belgian post, was reached the following day. Here the commander was informed that the river ahead was particularly rocky and difficult of navigation. It was therefore decided to put the *Mimi* and *Tou-Tou* aboard a flat-bottomed river steamer placed at our disposal by the Belgians. This task occupied several days, and we left Kadja on October 16.

A LATTER-DAY FAD INVADES THE AFRICAN JUNGLE: JOSEPHINE HAVING HER HAIR BOBBED (SEE ALSO ILLUSTRATION, PAGE 346)

More delay was caused en route by the steamer's running aground on the banks of the river, owing to sharp bends in its course. Other than this, things ran pretty smoothly, and on October 22 we came safely to the end of our cruise at Kabalo. The river journey had required 17 days.

Here we lost another officer, Lieutenant Hope, who suffered from sunstroke and had to return to a healthier climate.

All that remained now was a railway journey of 200 miles to Lake Tanganyika. Needless to say, we felt extremely happy at the thought of eventually getting to our destination—a prospect which had on several occasions seemed so remote—and the 200-odd miles between us and the lake seemed but a stone's throw. The boats and all gear were entrained without mishap, and a few days later we arrived at Albertville, on Lake Tanganyika.

We were accorded a hearty reception by the Belgians, who stated they had given up all hope of our getting through. A camp was formed and grass huts erected for our accommodation.

A TROPICAL STORM ON LAKE TANGANYIKA

By this time the rains had commenced, and the first night at Tanganyika we en-

PUTTING OUT A BUSH FIRE NEAR A TEMPORARY MAGAZINE

Curiously enough, in most parts of the Congo bush fires are of rare occurrence, although the natives usually have a fire going all night to keep prowling animals from their villages, and take no special precautions to avoid conflagrations.

NATIVES CONSTRUCTING GRASS HOUSES

Many tribes of the Congo construct round or oblong huts of grass stems over a framework of forked posts. Both the walls and roof of bamboo poles are thatched with banana leaves. The interior is divided into a few rooms, and there is only one door for entrance and ventilation. It is customary to have a fire in the house continually.

AGROUND ON A SAND-BANK IN THE LUALABA RIVER

The sandy bottom and banks of this river are very fickle and sometimes shift with surprising suddenness. Daily the good-natured native paddlers of the expedition had to shift the gear in the boats and jump into the shallows to heave the craft over the sand-bars.

countered a tropical storm. It broke over our camp in a hurricane of wind accompanied by ear-splitting bursts of thunder and vivid lightning, which illuminated the country for miles. The lake itself became a raging sea, enormous breakers rolling up and crashing on the shore, uprooting trees, and demolishing native huts.

We were thankful that our boats had not been launched; and in view of the violence of the storm, the commander decided not to launch them until a harbor had been devised, there being no shelter of any description for boats.

The lake roughly is 420 miles in length and varies in width from 20 to 50 miles. It is situated 2,800 feet above sea-level and in some places bottom has not been reached at 400 fathoms.

The water is not salt and can be drunk. This being a private fishery of the King of the Belgians, we were not allowed to use rod and line, but bought our fish.

The east coast, from one end of the lake to the other, was German territory, and the west coast was Belgian Congo. Our depot on the Belgian side was about half-way up, at a place almost opposite the German base known as Kigoma. The lake at this point was about 40 miles across. On a clear day the high hills on the German coast could be seen distinctly from our depot.

OBJECTIVE OF THE EXPEDITION

Perhaps mention should be made here of the real objective of our expedition. From time to time during the military operations in the vicinity of the lake, efforts had been made by British and Colonial forces to advance from either end along the German coast, the idea being to join forces at the German depot at Kigoma and drive the enemy away from the lake, back to the seacoast, and eventually out of Africa.

All such attempts had been futile, owing to the fact that at any time our troops attempted an advance along the German coast they were subjected to a bombardment from the German vessels on the lake.

ASKARIS, BELGIAN NATIVE TROOPS OF THE CONGO

The Belgian army in the Congo consists of African troops, recruited by conscription and volunteering and officered by Europeans. Its effective strength is between 15,000 and 18,000.

Well, it was to be our job to destroy the German fleet, and thus assist in making effective the activities of land forces operating against the enemy on their own coast; in fact, we were to be the key to the whole situation.

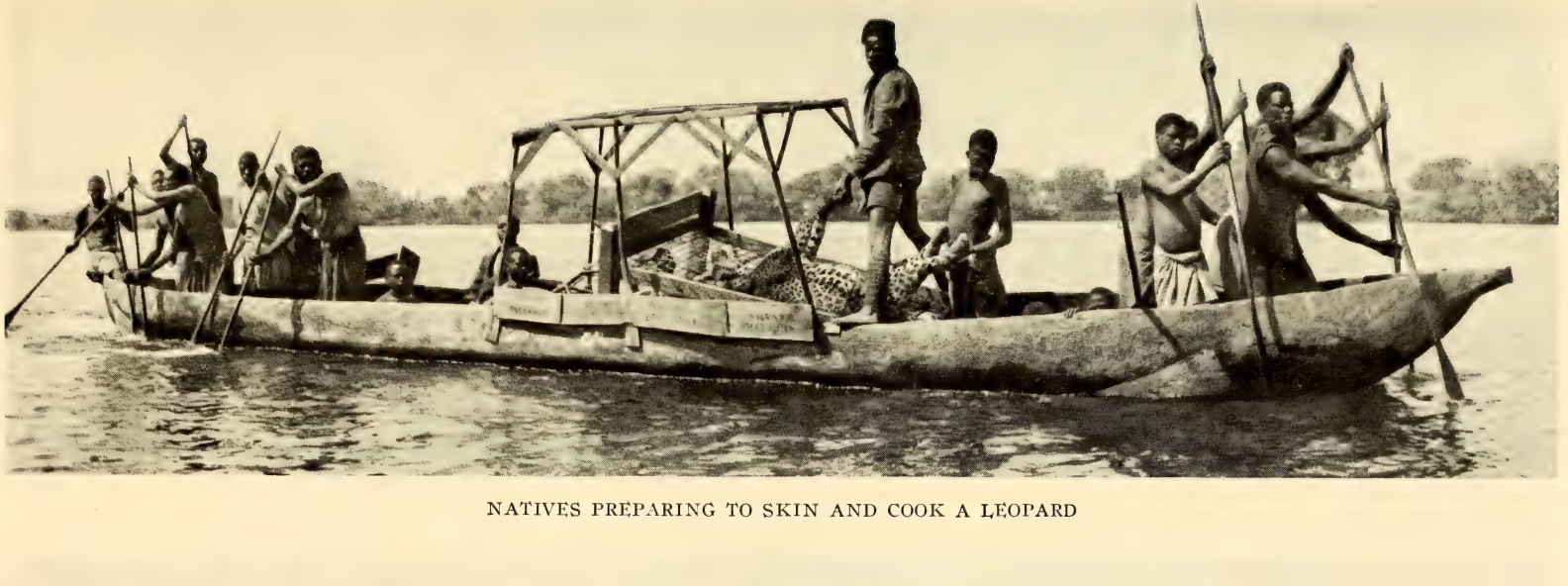
ARRANGING A BASE

But to return to the building of the harbor.

Tons of rock were blasted locally, and then taken down to the lake in trucks and dumped into the water. Gradually the rock piled up and extended out into the water, until finally a suitable breakwater and harbor were formed. This operation gave the natives the impression that we intended to build a road across the lake to the German coast, 40 miles away, and march across.

Time after time during the course of construction the breakwater was washed away by the violence of the waves, and it was not until December 23 that the boats were actually launched —nearly seven months from the date of leaving England.

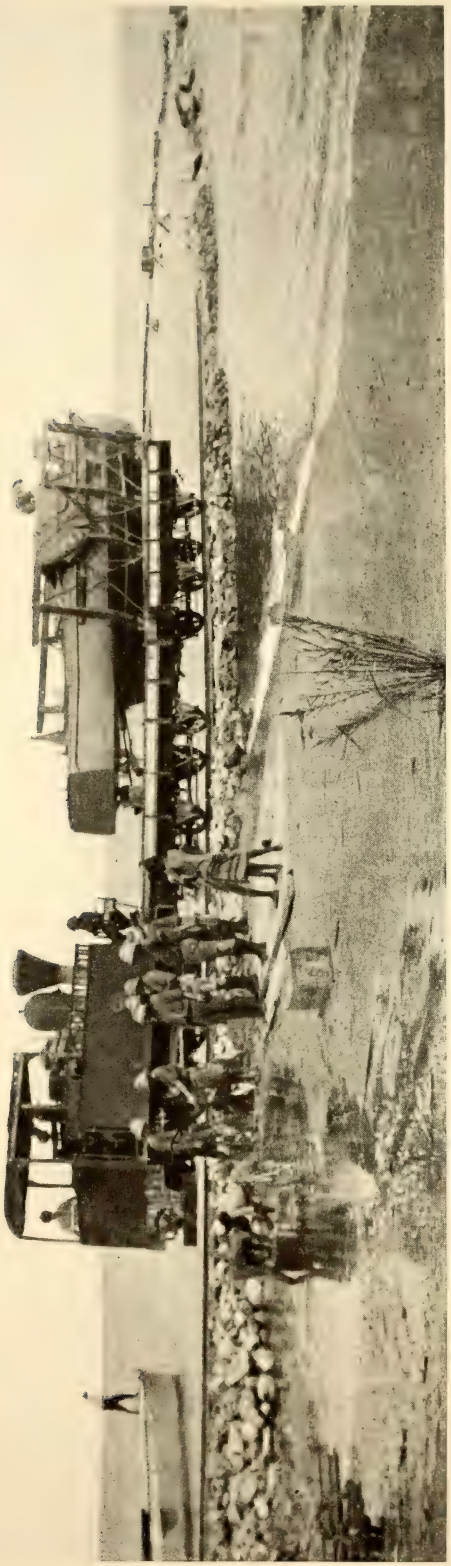
In the meantime the German vessels often came close to the Belgian coast, and on one occasion the *Kingani* came well within range of the guns of the Belgian forts. These guns had been placed in the fort only recently and the enemy



NATIVES PREPARING TO SKIN AND COOK A LEOPARD

VILLAGERS ALONG THE LUALABA RIVER WATCHING THE BOATS GO BY

This river is one of the most important tributaries of the Congo. Big game swarms in the luxuriant growth along its banks, and its waters teem with hippopotami, rhinoceroses, and crocodiles. Some parts of the river are crowded with native settlements, but in others its loneliness is weird and haunting. The Naval Africa Expedition journeyed down its waters from Bukama to the railhead at Kabalo—more than 200 miles in an air line.



LAUNCHING THE "MIMI" INTO LAKE TANGANYIKA

After blasting tons of rock to construct a breakwater and harbor, the boats were lowered down an inclined track by means of a hawser attached to a railway engine. Ammunition, guns, and provisions were then taken aboard and the expedition was ready for the fray.

were surprised to find themselves under fire. The *Kingani*, however, by clever maneuvering, managed to get away undamaged.

The launching of our boats was effected by lowering them down an inclined track into the water by means of a hawser attached to a railway engine. A three-pounder gun was then fixed forward on each boat and a machine-gun aft. Provisions and a supply of ammunition were stowed aboard, and on Christmas Eve, 1915, we were ready for the attack. We sat down, rather glad of a breathing spell, practically the first since we had started our trip, and waited for the enemy to leave their harbor.

We kept Christmas in the good old-fashioned style—at least as well as possible under a tropical sun—and each one of us gave a thought to the folks at home.

I tried to get an expression from my native servant as to what Christmas conveyed to the African mind, wondering if he were aware of its origin and meaning. He thought for a long time, and at last informed me that Christmas meant "All white boss drink plenty whisky!"

ENEMY BOAT SURRENDERS

Our festivities were soon cut short.

On Sunday, December 26, 1915, the hands being mustered for divine service at 9:15 a. m., a message was received

SECURING BOATS TORN FROM THEIR MOORINGS AFTER A STORM ON LAKE TANGANYIKA

Lake Tanganyika is subject to violent tropical storms, accompanied by impressive cloud, thunder, and lightning effects. The lake becomes a furious churning sea, dashing immense breakers far up the banks of its wood-fringed heights. Tanganyika is the longest fresh-water lake in the world—400-odd miles—and one of the most beautiful. Ujiji, on its eastern shore, is the memorable spot where Stanley found Livingstone. The lake was first visited by a European in 1858.

NATIVE TROOPS OF THE BELGIAN ARMY CUTTING ENEMY LINES OF COMMUNICATION

The Askari is a daring and efficient fighter. Most of the soldiers are recruited from the Bangala, the most intelligent of the Congo tribes.

from Toa, about 20 miles up the coast, reporting that an enemy vessel was sighted coming southward. Prayers were finished and the men ordered to get into fighting rig (khaki shirts and shorts) and to stand by their boats.

At 11 the boats left harbor, accompanied by the two Belgian boats, *Netta* and *Tenton,* which were ordered to stand by to pick up the crews of the *Mimi* and *Tou-Tou* should they be struck, as one shell hit would have been sufficient to sink either boat.

At 11:40 the German gunboat *Kingani* (this being the vessel reported) was well in Tembwe Bay, to the right of our depot, and apparently had stopped; but evidently sighting our boats suddenly, the presence of which on the lake the enemy had so far been unaware of, the *Kingani* turned to the eastward and made off at full speed.

The British boats gave chase, and at 11:47, when within a 2,000-yard range, opened fire with common shell. The enemy immediately returned the fire, aiming at the *Mimi,* which, however, drew

THE "MIMI" AND "TOU-TOU" STRIP FOR ACTION

The first naval engagement and British victory on Lake Tanganyika took place on December 26, 1915, and lasted ten minutes. The banks were lined for miles with excited natives, who left their inland villages and flocked to the coast to see a sight forever memorable in their lives. After the victory, they rushed to greet the commander, and trickled sand into their hair as a sign of respectful submission (see text, page 358).

THE FUNERAL OF THE ENEMY DEAD AFTER THE FIRST BRITISH VICTORY ON THE LAKE

The bodies from the *Kingani* were wrapped in canvas and buried by the British with full naval honors. Picked troops were put on guard over the graves for some time afterwards, lest some of the native soldiers should revert to cannibalism. There were no British casualties.

THE NATIVES MISTOOK SEMAPHORE SIGNALING FOR THE WHITE MAN'S PRAYER TO HIS GOD

"The news went through all the native villages that the Great White Chief had been seen making signs to his Ju-Ju (God), calling upon him to deliver another German ship into his hands." The second British victory convinced the natives that the white man had not prayed to his god in vain, and thus British prestige was greatly enhanced (see text, page 361).

astern until the enemy's guns could no longer bear.

The enemy then opened fire on the *Tou-Tou,* and although shells fell very close, none scored a hit. Again the *Mimi* maneuvered into position for attack, and after an engagement lasting ten minutes, during which time our gunner scored about 25 hits with high-explosive shells, the enemy hauled down his flag and surrendered.

ENEMY'S COMMANDER KILLED EARLY IN THE FIGHT

Through information gleaned from the survivors of the German crew, it appears that early in the engagement a high-explosive shell pierced the armored screen around the *Kingani's* gun and hit the German commanding officer, blowing the lower part of his body away. The same shell killed a petty officer. A second shell also pierced the screen and killed a warrant officer. A third hit the engine-room skylight and two native seamen and a native stoker either were blown or jumped overboard.

There remained but one European seaman, who was at the wheel; but this man was so dazed that he scarcely knew what he was doing. He continued to steer toward the German coast, until a chief engine-room artificer took command. Seeing that escape was hopeless, he hauled down his flag and stopped the engines.

Several attempts were made to board the prize, but were given up, owing to the roughness of the sea; not, however, before the *Mimi* had been damaged in collision and sprung a leak.

As the *Kingani* had been holed near the water-line on the port side abreast of the boiler and was in danger of sinking, Commander Spicer Simson ordered her to steer for our harbor. She was escorted on each side at half a cable's length by the British boats. On arriving in harbor, the prize was gently grounded, but sank

WHEN THEIR FIRST AËROPLANE WAS SIGHTED

Spell-bound, gazing upward with arms extended, eyes bulging, and mouth agape, the panic-stricken natives first believed the aëroplane a new kind of bird monster swooping down from the sky to destroy them. But when their fear was overcome, they clustered around the machine and referred to the pilot as "the Great White Chief from Heaven" (see text, page 359).

with a heavy list to starboard shortly afterwards. There were no casualties on our side, but the boats were much shaken by their own gunfire.

In the meantime great excitement prevailed on shore, where the action had been witnessed not only by the whole of the Belgian naval and military personnel, but also by thousands of excited natives.

These people had flocked to the coast from inland villages to watch a spectacle they had never seen before and are never likely to see again—a naval engagement. They covered every hill-top and crest along the coast, and when it became known that the German ship had been captured, their excitement knew no bounds.

NATIVES OVERJOYED AT VICTORY

They came bounding down from the trees and hill-tops, giving vent to loud whoops of delight and gesticulating wildly, simply falling over each other in their hurry to reach the beach in order to pay their homage to the new Great White Chief, our commander. There they assembled in thousands, arrayed in their brightest pigments and gaudiest loincloths, a jigging, jogging, frenzied mass of black humanity—a sight not to be forgotten.

The Belgians also expressed their joy in the usual demonstrative Continental fashion of embracing and kissing each other and by the singing of their national anthem. The members of the naval expedition whose duties kept them ashore were also embraced and kissed, which I rather think gave some of them reason to reflect that even victory has its disadvantages (this with all due respect to the bearded donors of the kisses).

When our commander stepped ashore, he was met by a guard of honor and overwhelmed with the congratulations of the Belgian officers. A band of native buglers greeted him with a musical fanfare, weird and wonderful, and the guns from a shore battery thundered out their salutations.

CANOES USED ON THE TRIP BACK TO CIVILIZATION

A part of the return journey of the expedition was made 600 miles down a tributary of the Luapula River in dugout canoes paddled by native experts. The logs are hollowed out by fire and primitive tools, cleverly shaped, and scraped down to an inch in thickness. Playful hippopotami and rhinoceroses frequently overturn canoes by rising up under them or lunging at them from the banks.

The natives, with grunts of satisfaction and approval, threw themselves flat on the ground and trickled sand into their hair—a sign of respectful homage—as the commander passed among them. The native women flocked around, in an effort merely to be seen by him, regarding this as a fetish which would protect them from evil spirits.

In the meantime the prisoners had been brought ashore, some hostility on the part of the Belgian natives being promptly quelled by the armed guards.

GERMANS KILLED IN ACTION BURIED BY BRITISH WITH FULL NAVAL HONORS

Later the remains of the Germans killed in action were brought ashore, wrapped in canvas, ready for burial. The interment, attended by both British and Belgian contingents, took place during the afternoon. Commander Spicer Simson officiated and full naval honors were accorded. A native bugle band, which had a few hours previously welcomed the commander ashore, played the last post, and a salute, fired by a party of 50 native soldiers, concluded the ceremony.

A gruesome incident in connection with the burial of the Germans is that a number of specially chosen native troops were put on guard over the graves for some time, day and night. The significance of this lies in the fact that a large majority of the Belgian native troops are recruited from tribes addicted to cannibalism and some of them might have felt tempted to take the opportunity of indulging in their horrible custom if precautions had not been taken to prevent it.

The victory was celebrated at nightfall in the Belgian and British camps and toasts were freely exchanged.

The natives also celebrated until early in the morning, performing wild native dances around huge bonfires to the beating of many tom-toms.

Shortly after the news had been wirelessed to the Admiralty in London the

following message was received by Commander Spicer Simson from Buckingham Palace:

> "His Majesty the King desires to express his appreciation of the wonderful work carried out by his most remote expedition."

"KINGANI" IS RAISED AND REFITTED

The *Kingani* was quite an asset, being much larger than either of the British boats, and therefore capable of carrying a larger gun. No time was lost in raising her and getting her thoroughly overhauled and repaired. A 12-pounder gun was dismounted from one of the shore forts and mounted aboard the captured German vessel.

To our knowledge, the Germans still had two vessels to be accounted for—the *Hedwig von Wissmann* and *Graf von Gotson.* Both were larger than the *Kingani* and carried more guns of a larger type. In addition to this, the Germans had a number of small armed dhows.

During the time the *Kingani* was being made seaworthy, the other German boats appeared from time to time on the horizon. Possibly they were searching the lake for the missing *Kingani,* but they always kept well off shore.

Apparently the fact that the *Mimi* and *Tou-Tou* had reached the lake was still unknown to the Germans, according to a statement made by the survivors of the *Kingani.* They had been astonished when pursued by our boats, and informed us that the German authorities on the other side were in entire ignorance regarding our arrival.

The excitement now died down, more or less, barring an occasional night alarm, which meant turning out; but this was no great hardship, as the persistent attentions of myriads of insects of all sizes and varieties usually made us glad to get up from bed to have a rest!

During this period of waiting the members of the expedition took the opportunity to indulge in hunting for elephant, lion, leopard, buffalo, and numerous species of buck, which abounded not far inland. Lions and leopards were particularly troublesome and daring, often penetrating our camp after dark and considerably depleting the numbers of our goats, cattle, and poultry.

Before our second engagement on the lake, an incident occurred which illustrates the superstition of the natives and which will show how British prestige was much enhanced in this part of the country.

Our commander had occasion to take a trip down the lake to Mpala, a Belgian post, and as he approached he stood up and semaphored a message with his arms to the effect that he was coming ashore. Semaphore signaling being unknown to the natives, they put their own interpretation on it, and the news went through all the native villages that the Great White Chief had been seen making signs to his Ju-Ju (God) in the sky, calling upon him to deliver another enemy ship into his hands.

OUR COMMANDER BECOMES A JU-JU TO THE NATIVES

This happened two days before the commander was successful in sinking the *Hedwig von Wissmann,* which convinced the natives that the Great White Chief had not prayed to his Ju-Ju in vain. They were so impressed that they molded images of the commander in clay (and good likenesses, too) which they worshiped in their villages as their new Ju-Ju. This was very well for Commander Spicer Simson, but it must have proved rather disconcerting to the Belgian White Fathers (a religious order) of the native mission—who had spent years and years in an effort to open the native mind to Christian teachings—to find their black flock suddenly turning to a new Ju-Ju in the form of a British naval commander in clay!

SEAPLANES CREATE WILD PANIC AMONG NATIVES

Up to the time of the arrival of the British motor-boats and traction engines, the only method of propulsion known to the natives was the paddling of their canoes. The traction engines especially were a great source of wonder to them. Imagine, then, the effect on these people of seaplanes soaring in the air above their villages!

It was simply amazing. Four "Short" seaplanes had been sent out and arrived

A FLEET OF RIVER CANOES AND THEIR STALWART CREWS (SEE ALSO PAGE 358)

NATIVE CARRIERS IN THE SWAMPS OF LAKE BANGWEULU, THROUGH WHICH THE NAVAL EXPEDITION PASSED ON ITS RETURN JOURNEY

immediately after the capture of the *Kingani*. They came packed in crates and were assembled at a Belgian post some 25 miles down the coast from the depot.

At about the same time, two portable wireless field sets carried on stout wagons arrived at our base. The wireless sets, with their tall steel masts, were erected in the British camp for experimental tests, much to the mystification of the natives, who, on being told that messages were being collected from the air, dubbed the operators "the White Chiefs who talk to Big Ju-Ju."

WIRELESS COMMUNICATION TERRIFIES NATIVES

It so happened that at about the time the Marconi operators made a test of their apparatus the Belgian airmen down the coast, having fixed up one of their seaplanes, decided to make a trial flight. Picture, therefore, the amazement of the superstitious negroes when, shortly after the wireless had begun sending test messages, with the rasping, crackling of electric sparks, lo and behold came the answer to their prayers to Heaven, as the natives thought, in the form of a low droning, gradually getting louder!

Suddenly the seaplane shot into view out of the clouds, describing circles and going through sundry evolutions over the camp. The natives stood spell-bound, gazing upward with arms extended, eyes bulging, and mouths agape.

The airman then made a sudden dive downward and that broke the spell. The savages bounded off into the bush, terror lending wings to their progress. Mothers snatched up their pickaninnies and dived for the shelter of their kraals, shrieking at the top of their voices. It was real pandemonium.

Hours later, after the seaplane had settled on the lake, the natives returned, but were visibly agitated by what they had seen. They were reluctant to approach the machine for some time, but finally, coming to the conclusion it was not a monster bird bent on destroying them, they clustered round and referred to the airman as "the Great White Chief from Heaven."

We come now to the sinking of the gunboat *Hedwig von Wissmann* by the *Mimi* and *Tou-Tou* and *Kingani*, the last named now in fighting trim and rechristened *Fifi*.

THE DESTRUCTION OF THE SECOND GERMAN GUNBOAT

At daylight on the 9th of February a message was received that a boat was in sight, steaming slowly southward. All being ready, the British flotilla started off to meet the enemy vessel, and at 8:35 a. m. she was sighted heading south-southwest at about six knots.

The enemy vessel turned immediately and attempted to escape, speeding up by putting oil on the fires.

The British flotilla went in pursuit at full speed, but until we were within 5,000 yards, the reflection caused by the glassy surface of the lake made the enemy appear like a dark blob suspended above the horizon, with a similar blob some distance below.

The *Mimi* first opened fire at 3,800 yards, making several hits in the first few minutes.

The *Fifi* opened fire from 7,500 yards, but was unable to register a hit. The range was reduced, and firing from about 5,600 yards, she scored about 40 hits out of 60 shots.

One high-explosive shell burst in the engine-room, killing the engineer and a native stoker, and also burst an oil tank. A second shell burst between the engine and boiler, killing a native stoker and wrecking the engines. A third blew a large hole in the ship's bottom and set fire to the oil, with which the engine-room was drenched.

ENEMY COMMANDER AND CREW JUMP OVERBOARD AND ARE RESCUED

The whole ship then appeared to be enveloped in flames, and Lieutenant Odebrecht, commander of the German vessel, realizing that his ship was sinking, gave orders to abandon it. Two of his three small boats were still seaworthy and were dropped astern; but just at this moment a shell passed through one boat and blew the other to pieces, killing a warrant officer and some natives and slightly wounding a European stoker and a native seaman.

The order was then given to jump overboard, and the survivors—12 Europeans, including their commander, and eight natives—were picked up by the British boats. The *Mimi* took the wounded on board and made for the harbor at full speed, so that they could have medical treatment. The enemy vessel was well alight by this time, and shortly afterward she suddenly up-ended and went down by the head. The British ships then made for harbor, where a repetition of the *Kingani* scenes took place. The prisoners were handed over to the Belgians, with the exception of the German commander, who was put on parole and was accommodated in our mess.

Due respect was paid to his rank, and he was treated with every civility by all members of the expedition. He seemed genuinely sorry when the time came for his transfer to a prison camp and thanked all for his generous and kindly treatment. He wore the Iron Cross.

A good deal of information was gleaned from the native prisoners concerning the number of boats, guns, etc., in the German harbor, and as far as we could ascertain, there were still two German boats to be brought to book, the *Wami* and *Graf von Gotson,* the latter carrying a gun far superior to any of ours in size and range. We also learned that there were some big guns mounted on the German forts ashore; but these, we found out later, were merely wooden dummies!

Then came another period of waiting, but nothing happened for some months. Our watchfulness was finally rewarded, however. Early one morning we surprised the German boat *Wami* transporting native troops down their coast. Though well out of range of our guns, the German commander realized we would overtake him before he could reach the safety of his harbor, so he beached on the German coast, landed his troops, and set fire to his ship.

It must have been apparent by this time to the German command at Kigoma that the game was up, and that their course on the lake had been run, as shortly afterwards they blew up the *Graf von Gotson* in the German harbor and destroyed all the small craft, in addition.

This was the end of German naval prestige on Lake Tanganyika—in fact, in Central Africa. The efforts of the Naval Africa Expedition had been entirely successful in destroying the enemy's power on the water, and therefore the military forces ashore were enabled to carry on their operations without hindrance.

Our little job being finished, we returned to England, having covered approximately 20,000 miles in our travels to Africa and back. This constituted a record distance for any individual expedition during the war.

With the exception of aërial transport, every known method of transportation was utilized in conveying the boats from England to Lake Tanganyika.

MANY HONORS AWARDED TO MEMBERS OF THE EXPEDITION

Commander Spicer Simson, R. N., received the Distinguished Service Order, three other officers were decorated with the Distinguished Service Cross, and the remainder were promoted. Six Distinguished Service Medals were awarded to gunners, etc.—in all, not a bad record for a party of twenty-eight. One Belgian decoration was awarded by the Belgian authorities, and that to the commander.

In conclusion, I am glad to be able to say that the expedition suffered no casualties, and that all the members on their return, after a short period of well-earned leave, were attached to other units in various spheres of hostilities; but I am sure that, whatever may have been their lot since, not one of them has dwelt on his experiences in the heart of Africa without a thrill of pride and a feeling of satisfaction at having been one of the privileged twenty-eight comprising the Naval Africa Expedition to Tanganyika.

Photograph by Horace W. Scandlin

A CHRISTIAN BRIDE OF KABYLIA

Between the Sahara and the sea, from the Atlantic to the Nile, the Berber type and temperament have persisted from prehistoric times. Among the fairest of these Libyans are the Kabyles, many of whom have blue eyes, ruddy complexions, and wavy brown hair. Most of them are Moslems of the Sunnite branch, but some have become Christians.

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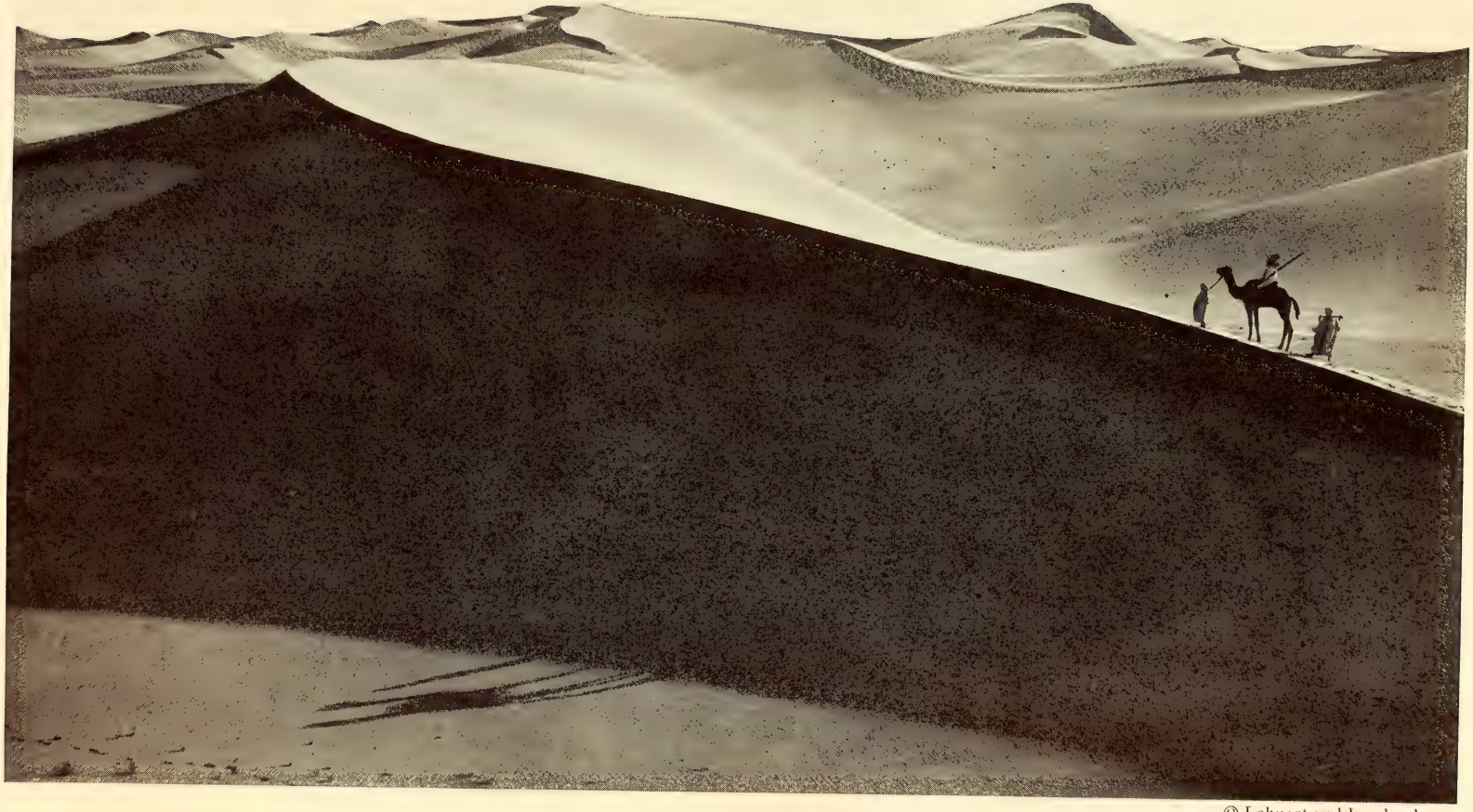
THE SPLENDID TERRACES OF NEW AND OLD ALGIERS

The view of Algiers from the sea is world-renowned. Along the edge of the harbor the Boulevard de la République runs for nearly a mile, raised on arches, with a double ramp near the center to give access to the quay. The modern French town occupies the level shore and the old town, with its narrow streets, thronged with Moors, Jews, Arabs, and Negroes, climbs the hills behind this modern veneer.



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THE SAND SEA OF THE SAHARA AT SUNSET

Barren and treacherous, the swelling dunes of the great African desert are not without life. The roving caravans and the errant winds leave footprints to mark their passing, but these exotic touches are soon swallowed up, like the wakes of ships, in the immensity of the billowing sands.

Photograph by Otto C. Gilmore

A DATE CARAVAN IN THE HEART OF ALGERIA

Each camel carries 600 pounds of dates, and, unlike the fleet-footed racing camels, these deliberate beasts will travel only 20 to 25 miles a day. When night comes, the tiny fires are lighted, the coffee and pipes are prepared, and the shouts of noonday give place to the characteristic low-voiced conversation of the desert camp. Because of the terrific heat, caravans keep on the move all day when away from oases.

Photograph by Otto C. Gilmore

A REST AMONG THE SAND-DUNES SOUTH OF EL WAD: ALGERIA

The Bedouin cameleer must have his tea and a pipe of kief, the desert man's opiate. This Arab carries with him enough food and equipment for 90 days of desert travel.

© Lehnert and Landrock

WHERE THE GOLD OF MANY LANDS BECOMES A WEDDING DOWRY

Among the Ouled Naïls, sentiment has little place. In their early youth these girls migrate to the Mediterranean ports, where, as dancers, they entertain the stranger and the wealthy native, and acquire ornaments of gold coins. When their glittering dowry is finally saved, they return to the desert and become dutiful wives in the tents of their own people.

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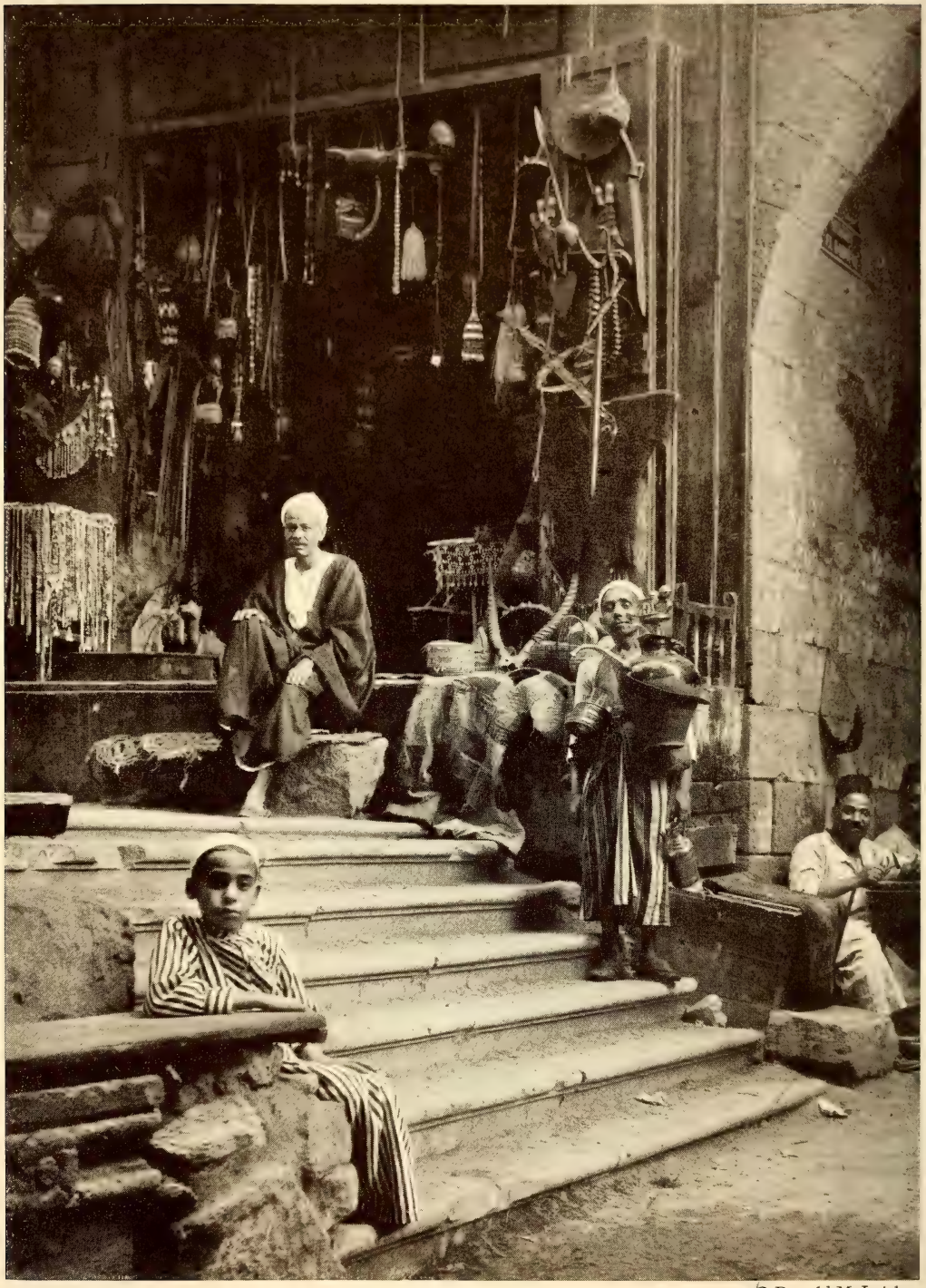
THE HORSESHOE ARCH IN THE GRAND MOSQUE OF ALGIERS

The pride of the Grand Mosque of Algiers (Jamaa-el-Kebir) is the façade, composed of white marble columns supporting an arcade. It is said to be the oldest mosque in Algiers, an inscription on the pulpit showing that it was in existence in 1018.



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AN AFRICAN CURIO SHOP IN THE KHÂN EL-KHALÎLI, CAIRO

The natives of Africa insist on having their bright beads and other trinkets from Europe. In return they barter baskets, bells, weapons, the horns and hides of animals, and other curios which delight the tourists who cannot take time to go to Gondokoro.

© Donald McLeish

A COMMON CARRIER IN EGYPT

The donkeys of Egypt are patient playfellows, intelligent, long-suffering, and economical of upkeep. In the cities it is only the natives who dangle their legs beside the animals' flanks, but in Upper Egypt the donkey is the tourist's first aid in transportation.

Photograph from Kodak (Egypt), Ltd.

THE STATUES OF MEMNON AT THEBES

More wonderful than the proverbial silence of the Sphinx was the traditional greeting which one of these colossal sitting figures of black stone, 50 feet high, gave each morning at the coming of dawn. The story was that Memnon, the victim of Achilles, greeted his mother Eos with a cry at sunrise, and that she shed dew-tears upon her beloved child. Both statues really represent Amenophis III, and the tradition which connected the statue at the right with Memnon dates only from the Roman imperial period, sixteen centuries later.

Photograph from Kodak (Egypt), Ltd.

THE PAPYRUS-BUD COLUMNS OF THE TEMPLE OF LUXOR

Dwarfed as it is by the more magnificent ruins of Karnak, the temple of Luxor is nevertheless a noble monument. To the left is the Court of Amenophis III, the builder, and the heavier cluster of columns to the right is a part of the Pronaos or Vestibule. The grouped papyrus stems forming the columns did not lend themselves to inscriptions and sculptures, so that in later examples the columns are smooth.

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IN THE BAZAAR OF THE TENT-MAKERS: CAIRO

The inner wall of an Egyptian tent resembles a wall painting in the Royal Tombs, its highly colored decorations being formed by small pieces of varicolored cloth sewed into patterns. These pieces of patchwork, mounted on heavy canvas, are much admired by the tourist and form interesting souvenirs of the land where such designs illuminate tent and tomb.

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AN ARITHMETIC CLASS IN ONE OF CAIRO'S 300 ELEMENTARY SCHOOLS

The average elementary school in Cairo is an insignificant affair, and one sees scant reminders of the traditional Arabic skill in mathematics; but it is to the *kuttâb* of Egypt, as to the elementary school of America, that one must look for its leaders of to-morrow.

Photograph from A. N. Mirzaoff

CHIEF OF THE IMPERIAL GUARDS OF ABYSSINIA

This picture of Pitaonan Yfrau was taken at the coronation of the Empress Waizeru Zauditu in the Abyssinian capital of Addis Ababa. Cabinet government has been in effect since 1919, following a year of personal administration by the Regent and Heir Presumptive, Ras Taffari.

A SHILLUK WARRIOR IN FULL REGALIA

The Shilluks are among the most picturesque inhabitants of the Anglo-Egyptian Sudan. Though skilled as hunters and fishermen, they are principally cattle-herders. They belong to the tall and wiry type of African Negro and through constant exercise become very agile. In the heat of battle, their lithe antics are supposed to strike terror to the hearts of their foes.

Photograph from A. N. Mirzaoff

A CORONATION PROCESSION IN ONE OF AFRICA'S THREE FREE STATES

Italy recognized the independence of Abyssinia in 1896, and ten years later Great Britain and France joined in an effort to keep Abyssinia free. King Menelik died in 1913 and was succeeded by his grandson, Lij Yasu, who was deposed at the age of 20, his aunt, Waizeru Zauditu, taking his place. View is of the procession to the palace during the coronation of the present Empress (see also page 376).

ALONG THE NILE, THROUGH EGYPT AND THE SUDAN

By Frederick Simpich

Author of "The Story of the Ruhr," "The Geography of Our Foreign Trade," "Along Our Side of the Mexican Border," "Every-Day Life in Afghanistan," "The Rise of the New Arab Nation," etc., in the National Geographic Magazine

EVER since the plague of frogs, since Pharaoh's hosts were swallowed by the sea, since Cleopatra's romance and snake-bite, Egypt has been in the eyes of the world.

"Nothing in this strange land is commonplace," Lord Milner has told us; and Napoleon, in his first talk with the Governor of St. Helena, declared Egypt to be "the most important country in the world." For sixty centuries she has been invaded and occupied, ruled and misruled, and ruined and rebuilt by assorted enemies of alien race, religion, and speech. Now, under a brand-new king of her very own, she begins a new era in her eventful, tumultuous history.

No land is older in sin and civilization than is Egypt;* few men are more mixed in race and religion than the modern dwellers along the Nile; and no region anywhere offers more puzzling problems or curious contrasts in politics, economics, and national ambitions than does modern Egypt.

She was civilized and knew the culture of fine arts and science when hairy cavemen were yet clubbing their prey and eating it raw on that island where classic Oxford now stands; yet to-day nine-tenths of her people are illiterate; many are blind from disease, and probably half of the real Egyptians are mere day laborers, for the wealth of Egypt is mostly in alien hands; half of the native farmers, or a million and a half families, own no land at all. Still, in this "Proverbial Land of Paradox" the people along the Nile, thanks to British aid, are better off than they have been in generations.

The fact that the population doubled in the 42 years of British rule is significant. A wonderfully developed irrigation system and a vast network of communications, both so necessary to agriculture in a rainless land, are hers.

In the last seven years land has trebled in value; rich farmers have grown richer; Nile traffic has increased fourfold; into the dusty desert horizon new tracks of steel have penetrated; and away up on the Blue Nile another great dam is being built to impound water for irrigating a yet vaster cotton-growing area.

EGYPT WAXED FAT DURING THE WAR

Egypt, more than any other land then under British protection, waxed fat off the World War. It is said that England paid out over a billion dollars in Egypt for foodstuffs, camels, mules, and supplies for the use of her armies in the Middle East.

With this access of wealth and the break-up of the Moslem East that followed the war, independent Egypt has now gained enormously in political and religious importance. Historic old Levantine ties are broken, too, and new channels of trade and immigration are opened. Caliphs have been upset and kings set up; new frontiers, new republics, and new geography stretch in bewildering disarray from the Suez to the Caspian. And, from the wild, fanatic Senussis of the Sahara to the untamed Afghan in Kabul, restless Moslem hordes brood and look on—doubtfully.

Gone forever is the "changeless, dreamy East" of a decade ago! Growling motor-trucks have crowded crawling camels from historic caravan trails; desert Arabs who used to read the future in the stars now read it in the passing planes of bold airmen blazing a sky trail from Rome to Tokyo, or London to Sydney.

A through train, "The Milk and Honey Express," runs from Cairo to Jerusalem, save for a break at the Suez Canal, when the passengers walk across

* See, in the National Geographic Magazine for September, 1913, "Reconstructing Egypt's History," by Wallace N. Stearns; "The Resurrection of Ancient Egypt," by James Baikie, and "The Sacred Ibis Cemetery and Jackal Catacombs at Abydos," by Camden M. Cobern.

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THE CITY OF THE FATIMITE CALIPHS FROM THE MOKATTAM HILLS

A splendid view of Cairo may be had from the reddish hills which lie to the southeast of the city. In the foreground is the Citadel, with the two slender minarets of the Mohammed Ali Mosque rising high above the wide dome. On the lower level, to the right, are the minarets of the Sultan Hasan and Rifaiyeh Mosques, and the big open square to the right is the courtyard of the Mosque of Ibn Tulûn, said to be a copy of the Kaaba at Mecca.

© Donald McLeish

THE STORY-TELLERS' CLUB: AN OUTDOOR CAFÉ IN CAIRO

Merchants, students, and beggars of many clans sometimes congregate at the open-air café, whose specialty is coffee. Smoke and conversation help to round out the menu.

Photograph by A. W. Cutler

THE FLOW OF LIFE OUTSIDE THE BÂB ZUWEILEH : CAIRO

The minarets of the Red Mosque rise above this sturdy gate built by Greeks in the eleventh century. It is one of the old town gates leading into the native bazaars.

Photograph by A. W. Cutler

THE STREETS OF CAIRO

Few cities so combine the ancient and the modern as does Cairo. From the terrace of the tourist hotel to the Sûk of the sandal merchants is a stride of centuries. The donkey has a load of clover fodder, and the camel is acting as taxi for two, with excess baggage.

a floating bridge at Kantara. And the Cape-to-Cairo line is nearly finished, too. How easy, even now, to visualize a Cape-Cairo-Calcutta route, with through trains via Mecca, the Persian littoral, and northern India, tying up at Basra with a Bagdad-Antwerp road, and at Bushire with a future Persian-Russian trunk line! (See Map of Africa, issued as a supplement with this number of THE GEOGRAPHIC.)

An old, old prophecy was fulfilled, the Arabs say, when "The Nile came to Jerusalem"—that is, when Allenby's advancing army laid a pipe line as it marched, bringing fresh Nile water with it across the Arabian Desert to Palestine.* An amazing accomplishment, certainly, yet quite in keeping with the bold, far-flung sweep of the Cross over this region where so long the shadow of the Crescent has lain.

In this far-reaching economic upheaval, white men of various creeds are swarming in to rejuvenate these long-abandoned, Biblical regions. British soldiers are in Bagdad now, and Christian armies have cut and recut the old trails of Genghis Khan, Xerxes, Darius, Marco Polo, and Alexander the Great, and from Cairo to the Cape, 5,000 miles, a Boer flying-man has driven his plane, swooping above reeking jungles where Stanley searched for Livingstone.

Geographically, Egypt comprises all the land between the Red Sea and the Sahara, and runs from the Mediterranean south to the Nubian border, including the Sinai Peninsula; in fact, it is about as big as Arizona and Texas combined. But, except for about 12,000 square miles along the Nile banks and in the Delta (or a region about equal to Connecticut and Massachusetts), Egypt is practically a desert.

Its people, including *fellaheen* (native peasants), Copts, Arabs, Greeks, Syrians, Turks, Persians, and Europeans, number over twelve millions.

Quickly told, the story of modern Egypt is that Napoleon invaded it in 1798; then the Albanian adventurer,

* See "An Old Jewel in the Proper Setting," in the NATIONAL GEOGRAPHIC MAGAZINE for October, 1918.

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A SMILING CUSTOMER FOR SWEET DRINKS IN CAIRO

Though a Moslem is not supposed to look upon the face of any woman who is not of his own family, that does not prevent the most cordial relations in common-place affairs of the street, like the buying of a cooling drink from the flabby water-skin with its shiny brass nozzle.

© Donald McLeish

A STREET IN OLD CAIRO

On its way to the Citadel this artery of the city passes beneath the shadow of the minarets of the Aksunkor Mosque, which is also called el-Azrak, meaning "the blue," because of the rich coloring of its tiles. It was built in 1346 by the ruling Amir, whose name it bears.

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AN ELEMENTARY SCHOOL IN EGYPT'S CAPITAL

Until recently, the teaching of the Koran formed the major part of the course of study in the *kuttâb*, or native elementary school of Egypt. The most rudimentary science was ignored or taught incorrectly. Under the British, conditions were improving. Now Egypt faces its own educational responsibilities.

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A CAIRENE EXAMINATION HALL

Amid ancient columns dating back to the Ptolemies, in a fourteenth century mosque built by Amir Altun Bogha el-Mârdâni, the modern theological student takes his examination in the doctrines of the Koran. Less famous than el-Azhar, which is Egypt's largest university, el-Mârdâni is a prominent factor in theological education in the capital.

Mehemet Ali, and his successors held mastery till it went bankrupt in 1879.

To protect creditors, France and England intervened, deposed Khedive Ismail, and set up a "dual control." Against this rule Arabi Pasha led a rebellion, which the British crushed at the battle of Tel-el-Kebir.

For the next 35 years khedives of the Mehemet Ali dynasty nominally governed, being advised by the British Consul-General at Cairo, whose advice, not strange to say, was usually taken.

From 1883 to 1907 Lord Cromer, a most able officer, held this advisory post, and raised Egypt from bankruptcy to prosperity. When the World War began, the reigning khedive Abbas Hilmi, long restive under English control, threw in his lot with the Turks (who had never relinquished their claim to sovereignty over Egypt), and a Turkish army moved down to Gaza to drive the English out. But England, regarding the Suez Canal as the jugular vein of her empire, could not then risk losing her foothold on the Nile. So, on December 18, 1914, Egypt was openly declared a British Protectorate.

EGYPT'S DARING AND SUCCESSFUL DRIVE FOR INDEPENDENCE

Hardly were the guns of Europe silent before Egypt began her daring drive for independence. It astounded even the East—this sudden, sensational leaping to life of a race so long bent to alien yoke. Dramatic as the story is, however, it need only be said here that in 1922 the British relinquished their protectorate, and acknowledged Ahmed Fuad as King of Egypt. (On April 25, 1922, the United States officially recognized the new nation on the Nile.)

Photograph by Maynard Owen Williams

THE SUEZ CANAL AT KANTARA

During the war, Kantara was the base of supplies for the Palestine military force. Its wharves, flood-lighted at night, were scenes of great activity, and back of it on the desert airplanes droned above the landing fields. Both foot-bridge and railway bridge crossed the canal, so that a Cairo carriage could be carried to the hill overlooking Jerusalem. Now the military stores have been distributed and Kantara is once more only a way station on the neck of land which unites Asia and Africa. The railway bridge has been removed.

This rise of Egypt to independence and the separation of Syria, Palestine, Mesopotamia, and Arabia from the old Ottoman Empire throw open the whole of this rich, long dormant land to barter and free contact with the Christian world.

Many important new channels of trade and travel are now being opened in these newly freed regions of the Middle East, whose people and potentialities the Turk so long and so cynically ignored. It is not yet easy to say whether immigrant Jews can really make a success at farming in Palestine in competition with settled Arabs; but with King Feisal on the throne of Iraq at Bagdad, and the British at his elbow, we know what to expect from Mesopotamian irrigation and oil development. And the trade of Syria under Greek and French stimulus is bound to grow enormously.

All these changes in the map, in trade routes and economic relations must necessarily have a marked effect on the new nation of Egypt. South of Egypt, too, lies the great Sudan, destined to add a vast area to the world's cotton-growing territories.

Till now Egypt, though so well known in many ways, has always been singularly aloof and isolated in her economic life. Most of her trade has been with the nations of western Europe. Greeks, Italians, and Austrians, settled in Cairo and Alexandria, have practically dominated Egyptian industry. Now, however, the new railway built from Cairo to Jerusalem ties up Egypt and the rest of Africa with the most important parts of the old Turkish Empire and indirectly with Europe itself. Much of the sea trade that formerly belonged to Smyrna and Stamboul will now reach its destination through Alexandria and Port Said.

With the near completion of the Cape-to-Cairo line, it is easy to see what close

Photograph by Maynard Owen Williams

A STATION ON THE RAILWAY FROM EGYPT TO SYRIA

This scene, taken near the Egypt-Palestine boundary, shows the desolate type of country through which the British drove their military line. From Kantara, beside the Suez Canal, to Jerusalem is a trip by rail of less than 12 hours.

trade connections Egypt must eventually develop with the vast domains to the south.

THE STORY OF A DESERT RAILROAD

Traveling one day, back in 1911, from Suez to Ishmailia, I met a Russian officer with whom I had once been quarantined on a pilgrim cholera ship at Jidda. "Some day," he said, "after there's been a big war in these parts, you'll see a railway running down here from Moscow and bridging this canal." Prophetic enough—except in certain details!

You who have made the voyage through Suez and recall its dreary sand stretches will find it hard to realize that, during the war, a magic city of 120,000 people sprang up here half-way between Ishmailia and Port Said. Kantara, this freak, mushroom, soldier town is called; it is the Suez terminus of the famous desert railway built north to Jerusalem.

When Allenby's hosts were invading Palestine, warehouses stretched for a mile along the Canal banks at Kantara, and at night high arc lamps glared above the yellow desert. Men toiled by tens of thousands, as when the pyramids were building.

This remarkable railway, starting north from Kantara, was laid on the sand, mile after mile, as the troops advanced; along with the track was laid the famous pipe line, carrying fresh water from the Nile, for hundreds of miles.

Pushing forward through the deep sand and lonely desert levels of the Sinai Peninsula, this road penetrates Palestine and traverses the fertile plains of Gaza. From Ludd, a branch (following the right of way of the old French line from Jaffa to Jerusalem) climbs the mountains to the Holy City, 200 miles from the Suez Canal.

The main line, running through the generally fertile and level area between the mountains and the Mediterranean, has its terminus at the seaport of Haifa, beneath the stately slopes of Carmel. One writer says: "To those who were present at Jerusalem on June 15, 1918, and witnessed the departure of the first through

Photograph by William Reid

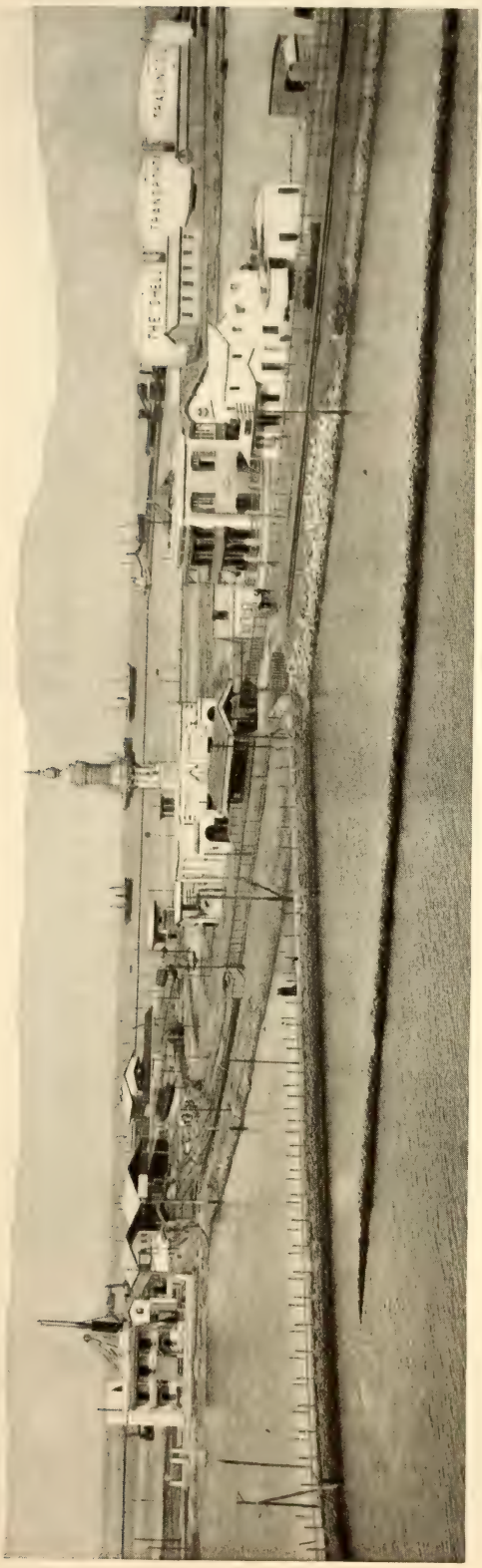
COALING A STEAMER AT PORT SAID, THE ENTRANCE TO THE SUEZ CANAL

Primitive methods of coaling are still employed here, each native carrying a little basketful on his shoulder and emptying it through a hole in the deck. All the traffic to and from the East converges at the port, and there are often dozens of steamers in the roadstead. The domes of the Canal Administration buildings are seen in the distance, with the city to the right.

© Donald McLeish

CHILDREN OF THE ARAB QUARTER OF PORT SAID

The Arab Quarter of Port Said was notorious until war conditions made it necessary that this section of the city be cleaned up. Few places ever underwent a greater change. Dumping place of the world's riffraff, it long since had brought disrepute upon the Arab himself, who is usually abstemious and sober.



Photograph from Frederick Simpich

WHERE "EAST OF SUEZ" BEGINS

Before the construction of the canal, Suez was a miserable Arab village. Now more than 2,500 Europeans share the misery. Hot, bare, sandy, and cheerless, Suez is made more intolerable by the endless procession of tantalizing ships passing by on their way East or West.

train in history from the Holy City to Cairo, it seemed as if a significant step had been taken in the onward march of civilization."

Notwithstanding the great demands on it during the war, when military trains ran from Cairo to the farthest boundaries of Syria, the system held up very well. Its distances in Egypt are not very great. Cairo is only 130 miles from Alexandria and 236 miles from Assiut; the more important commercial towns, such as Tanta, Benha, Zagazig, and Damanhur, are all in the Nile Delta.

HOW EGYPT PROFITED BY THE WAR

Egypt profited greatly from the war. The British army poured out vast sums for camels, mules, grain, and supplies, and thousands of Egyptian laborers and artisans were paid war-time wages. As a half-way station between East and West, Egypt became the clearing-house for troop-ships from the Seven Seas.

After the evacuation of Gallipoli, a whole army came to Egypt to rest and reëquip. Vast hordes came, also, from Australia, New Zealand, and India, to organize and train.

The dry, clear desert air and open spaces made of Egypt an ideal training ground for flying-men, and for months the planes of daring students from the world's outposts split the sky above the Pyramids and the Sphinx, and hovered over the old battleground of Tel-el-Kebir.

Fugitives of all races fled thither—some are still there—from beyond the Jordan, and German colonists from Jerusalem and Jaffa were taken there and interned. In Egypt, also, were housed the thousands of

prisoners captured during Allenby's two campaigns; in a single prison hospital at Cairo there were 12,000 beds.

To-day Alexandria is rich. During the war she was the base where all supplies for the Saloniki, Mesopotamian, and Egyptian expeditions, as well as for the operations against German East Africa, were stored.

For his Jerusalem campaign, in 1917, Allenby had a force of 260,000 British and Indian troops. In 1918, when the invasion of Syria began, the strength of the Egyptian force, including whites and Indians, was about half a million men and 260,000 animals.

It cost $200,000 a day to feed this army and much of the supplies came from Egypt. Large sums were spent also in wages paid to Egyptian tradesmen, carpenters, blacksmiths, and the like. Cash was paid, too, for the 30,000 camels which were in use.

Thus wealth poured into Egypt, which seems to have suffered less from the shock of war than any other country then under British control.

Many of us know Egypt as tourists know any other country. You will all recall the old fakir at the "Continental," in Port Said, who rolls an egg between his palms till it turns to a live chick, while his assistant inhales a tired snake or plucks a fat toad from the beard of a scandalized Scotchman.

Some of you, too, have bought "real Egyptian antiques" and "scarabs" made in Naples; and you have marveled over mummies 3,000 years old (fitted with teeth, for verisimilitude, bought from an advertising dentist in London). And every year enough ancient coins are "found" to meet all demands!

In other words, we know superficial Egypt—the donkey boys, the beggars whining for bakshish, the smirking guides; we have seen the tawdry *café chantant,* and Shepheard's, and we have been photographed astride a blasé, flea-bitten old camel standing on the sands before the Sphinx.

But we Westerners, what do any of us really know of the *Egyptian?*

I remember a night at Kantara. Standing where the pontoon bridge now is, and where the ancient caravan route from Egypt crosses the Suez on its way to Syria, in the red blaze of desert dusk, I saw a woman, an erect, slim-limbed woman of the Nile, barefooted, in all the unconscious dignity of ancient race. On her head she carried a water-jar—gracefully and easily, like Rebekah on her way to the well. About her lithe form flowed the black folds of the loose, primitive robe that marks the Moslem woman.

Casually, without interest, from over the rim of her yashmak she glanced at us; but with what eyes! Lustrous, long-lashed, unlike the eyes of any other women anywhere—eyes set under heavy, straight brows, the odd eyebrows of old Egypt.

"A woman of the pyramids," whispered my companion, "young and a good looker, yet 6,000 years old in face and form!" Handsome she was, indeed; yet astonishingly like the crude pictures of the women of ancient times, as we see them carved on the temple walls.

"THE INARTICULATE FELLAH"

These strange people, isolated here for ages, have developed and maintained certain distinct physical and racial characteristics. When you see the modern *fellah* at work with mallet and chisel, or scratching the sun-baked plain with his crude hoe, or dipping his clumsy fish-net into the Nile, he is, in face and physique, startlingly like the pictured Egyptians of the Pharaohs' times.

Since prehistoric days this race, a vast farming colony, has lived along the Nile and in that great delta which ages of floods have built out into the Mediterranean. Though the Persian conquest, about 521 B. C., ended the period of native rule, the mental and physical aspects of the modern fellah are, so far as we can judge, exactly like those of his early ancestor who sweated under the Pharaohs—and this notwithstanding centuries of submission to Persian, Macedonian, Roman, Arab, Mameluke, Turk, and Briton.

Four-fifths of all Egypt's population, or something near nine millions, belong to this ancient race.

Culturally, the fellah has been Arabized; he speaks a form of Arabic and turns to Mecca in his prayers. Otherwise he is the same silent, melancholy,

WEIGHING BAGGED COTTON IN EGYPT

Photographs from A. N. Mirzaoff

TRANSSHIPPING COTTON AT ALEXANDRIA

Egyptian cotton has won an enviable reputation, but at great cost to the soil. The annual inundations do not now furnish enough fertilizer for the crop and some fields are never inundated, but get what water they need from irrigation canals.

Photograph from A. N. Mirzaoff

PUTTING STRENGTH BACK INTO THE SOIL: AN EGYPTIAN COTTON FIELD

inscrutable person who doggedly dragged granite blocks for hundreds of miles to build the pyramids, who blindly bent to the big sweeps of the early Egyptian galleys, or who conceived and began to dig the Suez Canal centuries before de Lesseps was born.

Hard work is his lot from the cradle to the grave. Riding through the great Delta region, you will see a boy or girl of eight leading the ox in the fields, while the father holds the rude plow. The children herd goats, too, and aid in cotton-picking.

THE NILE'S GIFT IS MARRED BY MUD

And though "Egypt is the gift of the Nile" it is a gift with a string to it, whose name is *mud*. Keeping the canals free of silt and keeping the water going has, figuratively, broken the tired backs of millions.

Many power pumps are in use, of course, especially on the larger estates; but to-day gasoline is scarce and expensive, and the average small farmer must water his little patch of land with the *shâdûf*, a primitive balancing apparatus wherein a long pole with a rock weight on one end and a pail on the other is used to lift water from the canals.

Two other awkward but ancient irrigating machines are the "water snake," or "Archimedean screw," and the *tâbût;* these wooden water wheels are used to lift water from the canals and pour it onto higher levels.

The thousands of miles of canals serve not only for irrigation, but also to distribute drinking water and as channels of traffic. Sail-boats on these ditches, seen from a distance, seem to be running on the ground over the flat country.

The Mahmûdiyeh Canal connects Alexandria with the Nile, and the Ishmael Canal takes off from the Nile near Cairo and carries water to Suez.

Nile mud alone no longer is adequate to enrich the fields, and to-day the fellah must buy much high-priced imported fertilizer.

The renter usually leases a piece of land for two or three years; the owner furnishes seed and work animals, and takes his share of the crop. Cotton, sugar-cane, corn, wheat, and rice are staples. Egypt grew corn for export to feed Rome in ancient times.

Photograph by Earle Harrison

A SUGAR-CANE CAMP ON THE UPPER NILE

During the last few decades the cultivation of sugar-cane has become an important industry along the Nile.

Photograph from Kodak (Egypt), Ltd.

SHELLING CORN IN THE NILE VALLEY

Ever since the days of Joseph and his brethren, Egypt has been known as the granary of the Near East.

Photograph from Kodak (Egypt), Ltd.

AN ORIENTAL VERSION OF THE OLD OAKEN BUCKET

The shâdûf is a familiar sight along the banks of the Nile and the canals. The water basket of woven reeds is balanced by a counterweight of mud.

Water-buffalo, oxen, and camels are the chief work animals on the farms; most of the horses and donkeys in Egypt are owned by the townspeople.

While the milk of goats, cows, and camels is used, the fellah depends mostly on the water-buffalo for his milk supply. This ugly, awkward beast requires less food and gives more milk than the cow and is less susceptible to diseases.

Few animals are raised for slaughter, probably because of the unfavorable climatic conditions. Turkeys and chickens are numerous, but domestic ducks and geese are rare. Around the margins of the lagoons, however, and in the Nile Delta waterfowl, snipe, and other shore-birds are abundant; snipe are trapped in great numbers—in so wasteful a manner that police regulations now seek to protect these birds. And you who know the Suez trip will remember the amazing number of flamingoes that rise and fly about as your steamer passes through the Bitter Lakes.

Nile fish are fat and unsavory; along

Photograph by A. W. Cutler

THE UNEQUAL YOKE OF THE EAST: AN EGYPTIAN FELLAH PLOWING WITH A CAMEL AND A BUFFALO

The forked stick of the days of the Pharaohs is still seen along the Nile, although the cotton boom stimulated the importation of more modern implements.

the seacoast Arabs catch fish enough for the hotels in the larger Egyptian cities.

HOME LIFE IN EGYPT HAS ARABIC FLAVOR

In the daily home life of the country fellaheen, the influence of Arab culture is uppermost. "Marry what you like of women, by twos and fours," says the Koran; so polygamy exists; but it is too expensive for the average fellah.

Every village has its coffee-shop, where water-pipes are for rent. Here, too, is the ever-present professional story-teller, the letter-writer, the snake-charmer, the fakir, and the dancing-girl.

From our viewpoint, such a life is hopelessly dull. The Egyptian monologue artist has told the story of Sultan Baibar and the adventures of Abu-Zed, without variation, for probably a thousand years; every member of the coffee-house crowd knows the yarn by heart; also, the tune that is played on the "Aüd" lute, the "Nai" flute, and the "Kamenge" fiddle, for it is always the same. So is the Egyptian dance—not a new step or movement since the days of Rameses!

Amusements are more varied in the larger towns. Here American moving pictures are shown, shabby one-ring traveling circuses are met, and the rising generation is beginning to go in for games and sports.

Plainly, a new era is dawning in Egypt, and it is admitted through all the East that far-reaching economic and cultural changes are sweeping over the country. But it probably will take many years of progress to transform the slow-moving, fatalistic fellah of the lower rural class. He still sticks to his humble mud hut, scantly furnished with earthen pots, tin cans, and straw mats, and to the habits of life and work that long centuries have drilled into him.

Building contractors say the fellah would rather carry dirt in a basket than use a wheelbarrow because his ancestors had no wheelbarrows. And, says the fellah, vaccination and similar hygienic measures are sinful, for is not one's fate

Photograph from Kodak (Egypt), Ltd.

LOCAL COLOR FOR THE EGYPTIAN PICTURE

Bare-foot women go back and forth between their mud-walled huts and the slippery banks of the muddy Nile, with earthern water jars perched at rakish angles on their steady heads.

predetermined by Allah, and is it not a sin to fight the will of Allah?

Should an enemy with the "evil eye" turn his glance upon one's camel, the camel will go lame, of course; what's the good of worrying? *Kismet!*

FOUR CHILDREN IN EVERY HUNDRED ARE BLIND

Four children of every hundred in Egypt are blind in one eye, a horrified scientist estimates, simply because fatalistic parents sought no timely remedies. Infant mortality reaches 27 per cent.

Any precise definition of Egyptian racial groups is impossible. "Who is an Egyptian?" is an ethnological enigma handed down from Pharaoh to Pasha. Even the official Egyptian census-taker has divided the Egyptians, as well as he could, into, first, natives; second, Syrians and Armenians; third, semi-sedentary Bedouins—that hybrid between fellah and Bedouin, who has one foot on the cultivated land of the Nile Valley and the other on the desert; and, fourth, nomad Bedouins, who are Bedouins pure and simple.

There are many other foreign elements in Egypt besides the English. Alexandria, for example, is said to be as cosmopolitan to-day as it was 2,000 years ago. Greeks were to be found there in great numbers under the Ptolemies, and to-day they permeate every branch of commerce. Italians are encountered in all walks of life. More than a hundred years ago French civilization was implanted along the Nile, and French is still the most widely spoken foreign tongue.

The Turks, who have lived in the country five or six centuries, still constitute the aristocracy of Egyptian society; but till recently, at least, they intermarried little with the Egyptians. Syrians, as money-lenders, pawn-brokers, and merchants, swarm in all the towns and trading centers.

THE COPTS, MOST NUMEROUS OF CHRISTIAN GROUPS

Of the three Christian groups—Armenians, Syrians, and Copts—the last named are by far the most numerous, nearly 700,000, according to the last census.

Though Christian in name for 1,500 years, as Lane says, the modern Copt has become in manners, language, and spirit a Moslem. Coptic women are almost as secluded as Moslems. Their children are generally circumcised, and the Coptic marriage and funeral ceremonies are very similar to those of the Moslems.

In his great work, "Modern Egyptians," Lane sketches the Copt as a sullen, bigoted, avaricious, and dissembling character. Sir John Bowring is less harsh. Although the Turks, he says, have always considered the Copts "the pariahs of the Egyptian people, yet they are an amiable, pacific, and intelligent race. They are to the counting-house and pen what the fellah is to the field and plow."

Cromer compromises by saying that the chief difference between the Copt and the Moslem is that the former is an Egyptian who worships in a Christian church, and the latter is an Egyptian who worships in a Mohammedan mosque. He adds that the Copt has a more accurate habit of thought than the Moslem, and, therefore, makes a better bookkeeper, surveyor, or engineer. Many Copts have been educated in the American missionary schools of Egypt. The late Minister of Finance, Yussuf Wahba Pasha, belonged to this group.

THE SYRIAN A POWER IN EGYPTIAN FINANCE

The Syrian—bland, shrewd, and cosmopolitan—is to Egypt what the international Jew is to Europe—a power in finance, a silent partner in politics.

Cromer says: "Whether judged from a moral, social, or intellectual point of view, the Syrian stands on a distinctly high level. He is rarely corrupt. There are many gradations of Syrian society. A high-class Syrian is an accomplished gentleman. . . . It may be said with truth that he is really civilized. In this respect he is probably superior not only to the Copt, but also to the Europeanized Egyptian, who is too often but a mere mimic."

Though certain Armenians of distinction, like Minister Tigraine Pasha, have held high offices in Egypt, they are represented along the Nile mostly by the shop-

© Elmendorf, from Galloway

A SAND-STORM ON THE BANKS OF THE NILE

Egypt is so thoroughly tamed, as far as the rich tourist is concerned, that the coming of a sand-storm, like this one at Beni-Hassan, forms a new thrill, unwelcome at the time, but fascinating in retrospect.

keeping class and are comparatively few in numbers.

THE BERBER'S PLACE IN EGYPTIAN LIFE

The Berbers, strung along the Nile from Aswan to the Fourth Cataract, and known also as Nubians, are quite different from the rest of Egypt's peoples. Though lazy and incapable, they look on the Egyptians with contempt and never intermarry with the fellaheen. Many white men, moreover, will tell you the Berbers are more honest and dependable, when they do work, than are many other natives.

The small, sandy farm of the Berber, with its meager fruit crop, is hardly enough to support him, so he and his older sons usually go to work as farm laborers for a part of the year in Lower Egypt.

In Alexandria and Cairo the Berbers are in demand as servants, grooms, and coachmen; and there the modern idea has caught on, for we find the one-time "big black Nubian slaves," who used to stand naked beside Pharaoh's throne, waving peacock fans to keep the flies off His Idle Majesty, now organized into a labor union and using the strike to force their demands!

EGYPTIAN WOMEN HAVE COME TO THE FRONT

In fact, among the political phenomena of Egypt, the strike as an economic weapon is becoming quite common. And another phase of the national idea, or emotion, is the part Egyptian women are playing. Sharing their husbands' ambitions, they helped put the Egyptian nation on the map.

Like the modern Turkish women of Stamboul, many of these Egyptian women, Moslem and Copt alike, are versed in the literature and politics of Europe, and often during the struggle for independence they joined with the men in signing petitions to the British Government.

The famous University of el-Azhar, the chief seat of learning and center of political thought of the whole Moslem world, is located in Cairo. Though pupils come from all over the Mohammedan world, Egypt sends most of them; and, as a sign of the times, it is significant that many of these students are the sons of the fellaheen. To a certain extent it was these students who, returning to the rural regions, spread the new doctrines of freedom and equality learned at the university, and helped to win independence.

The Egyptian native press, too, is influential; one paper printed at Cairo has a circulation of about 20,000 copies. Egyptians who cannot read gather in the bazaars in the evening to hear the papers read aloud by students. In all towns the mosques are sources of propaganda and political teaching, and the Copts, though Christians, are, oddly enough, allowed to speak on political subjects at the mosques.

THE FUTURE OF THE SUDAN

The economic and political future of the Sudan is closely linked up with that of Egypt.

Since that day in January, 1885, when the mad men of the Mahdi killed General Gordon with their spears, many a stirring scene in the drama of civilization has been staged in the Sudan. Like Bagdad, Afghanistan, and the Forbidden City, the Sudan is one of those picturesque places whence adventure and romance seem always to spring.

Because of our own growing cotton shortage, the Sudan holds new interest for us, as it is called the greatest potential cotton land in the British Empire. In area it covers about a million square miles. No count has ever been made of its people, but they are estimated at three and a half million. A few British officials (about one to every 10,000 square miles), with the help of minor Sudan and Egyptian assistants, administer the government.

A THINLY PEOPLED LAND OF AMAZING DISTANCES

A sort of Arab mixture inhabits the north of the Sudan, and in the south are the blacks. In the east you find your old friend the "Fuzzy-Wuzzy." On the whole, it is a thinly peopled land of amazing distances. You can go south from the Egyptian frontier six hundred miles by rail before you get to Khartum. From there south you can go another thousand miles on a flat-bottomed, paddle-wheel

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"FORTY CENTURIES LOOK DOWN UPON YOU"

Riding an antediluvian camel under the broken nose of the Sphinx has been a favorite outdoor sport in Egypt since the time of "Innocents Abroad." One has the sense of being held in suspense by history while the ever-ready camera records the grain of incident in the desert of time.

Photograph from Kodak (Egypt), Ltd.

THE PORTAL AT KARNAK BUILT BY THE THIRD PTOLEMY

This impressive gateway, erected by Euergetes I and representing the conqueror of the Seleucidæ praying and sacrificing to the gods of Thebes, ushers one in to the wonders of Karnak.

Photograph from Frederick Simpich

A CARAVAN PASSING THE RUINS OF OLD MEMPHIS

For nearly fifty centuries Memphis commanded the admiration and wonder of resident and traveler. To-day a prostrate colossus of Rameses II is about all that any one would care to see.

Nile steamer before you reach the southern boundary of the Sudan, which is almost on the edge of the great lakes and a third of the way to the Cape of Good Hope.

Some travelers enter from the Red Sea via Port Sudan (700 miles south of Suez), proceeding west by the new railway.

The White Nile splits the Sudan for nearly 2,000 miles from south to north and is navigable the year round above Khartum.

The Blue Nile runs down from the Abyssinian hills and joins the main river at Khartum, forming an apex called the Gezîreh, or "Island." This vast flat island is the granary of the Sudan.

It is in the northern part of this Gezîreh that the new irrigation projects are being undertaken. Engineers say land is the cheapest thing in the Sudan. Water is abundant, but labor is scarce.

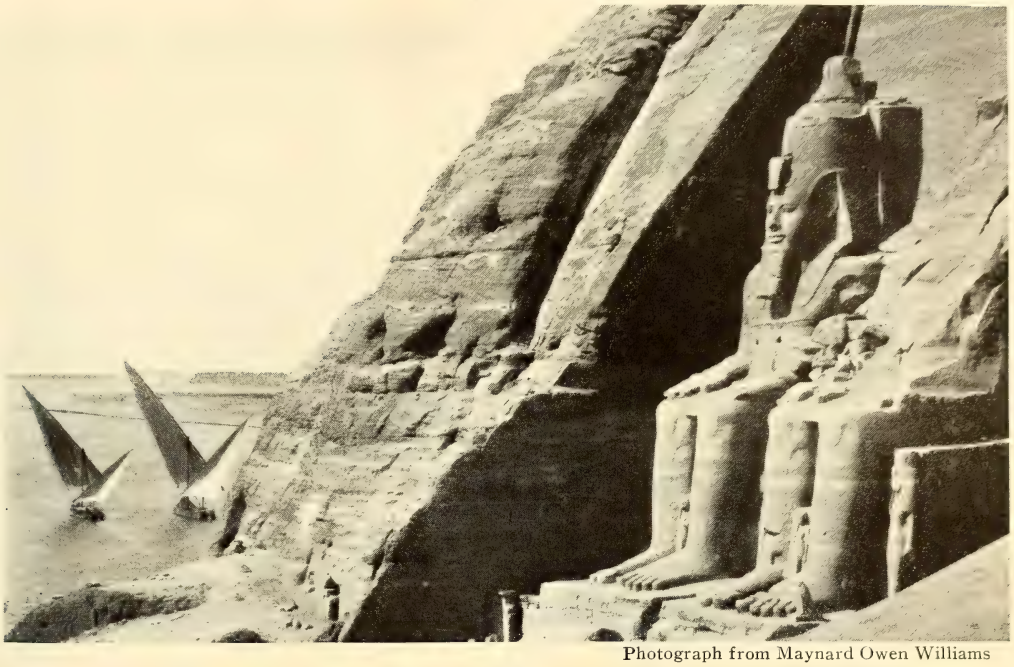
BRITISH ARE STRICT GUARDIANS OF THE SUDAN'S WILD GAME

If you want to bring a pet wart-hog or a giraffe home with you from the Anglo-Egyptian Sudan, you will first have to get a permit from the British authorities. They watch over the wild game to save it from exploitation for commercial purposes. The hunting of elephants and ostriches for ivory and feathers is strictly controlled; trade in skins and trophies is prohibited. The exportation of captive wild animals for display in zoos and parks is kept within reasonable limits.

Egypt depends mainly on the Sudan for its meat supply, and thousands of acres of land have been put under pump irrigation to provide food crops for Egypt, whose people, as one investigator said, cannot subsist on bank notes and cotton.

Slavery, once so common along the Upper Nile, has been largely put down, except, perhaps, in the remoter regions. The country is almost treeless, especially north of Khartum; the few trees found are mostly species of acacia, known locally as the *samr*.

South of Khartum, to about 12° north,



Photograph from Maynard Owen Williams

COLOSSI OF RAMESES II AT ABU SIMBEL: LOWER NUBIA

The façade of the rock temple of Abu Simbel faces the rising sun across the Nile, so that the earliest rays penetrate to the inner sanctuary. On each side of the entrance are two colossi of Rameses. The greatest of Egypt's rulers is here shown wearing the double crown of Upper and Lower Egypt.

narrow belts of *sunt* trees (another sort of acacia) line the banks of rivers. This sunt-wood is prized for boat-building, for tanning purposes, and is much used for fuel.

Farther south, on the White Nile, where there is more rain, forest growths increase, and over in the Blue Nile country the giant baobabs (*Adansonia digitata*) and the Sudan ebony (*Dalnergia melanoxylon*) are found. Another Sudan tree known to commerce is the African mahogany of the Bahr-el-Ghazal province. Fires, lit by natives on hunting trips or to clear land, have destroyed much good timber in the Sudan.

THE MYSTERY OF THE SOURCES OF THE NILE

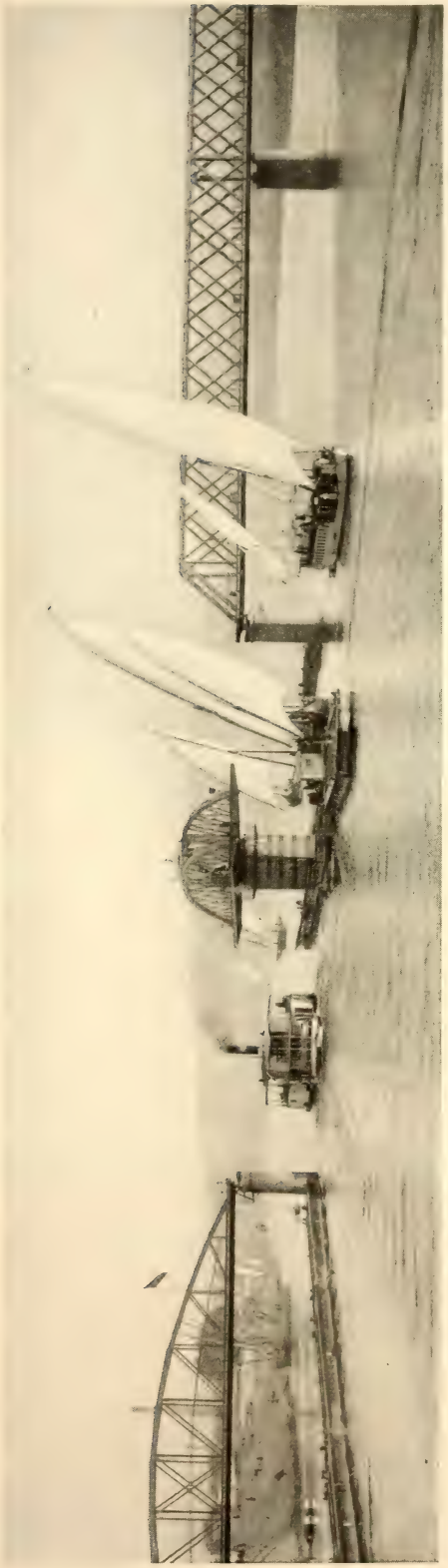
The Nile, of course, saves this region also from becoming an empty waste. Historic and important as this river is, its sources were for centuries shrouded in mystery. Early geographers advanced various odd theories; some said the Nile and the Ganges rose in the frozen mountains of north Asia, and other imaginative folk declared it came from "the Mountains of the Moon."

It was not till 1862 that Speke and Grant located the main source of the White Nile in what is now called Victoria Nyanza (Lake Victoria).

On its course through the Sudan the Nile is joined by the Bahr-el-Ghazal, the Sobat, the Blue Nile, and the Atbara. The Bahr-el-Ghazal flows out of the vast, mysterious sudd swamps of the west; the other three streams run down from the east, bringing the drainage from the Abyssinian hills.

In all Africa there is, perhaps, no greater natural curiosity than this famous sudd (Arabic for block), a sort of vast floating island of reeds, papyrus, and small plants in the marshes formed by the lower reaches of the Bahr-el-Jebel and Bahr-el-Ghazal.

British scientists have estimated the sudd area at 35,000 square miles. One writer says: "To the eye the effect is one of a vast extent of brilliant green papyrus, feathery reeds, and sword-grass, five to twelve feet above the water, broken by



Photograph by Edgar K. Frank

A BRIDGE IN THE LAND OF THE PHARAOHS

Egypt is a land of many ferries and few bridges. Only once above Cairo does the railway cross the Nile. Life follows the old systems which were in vogue before the days of the bridge, and even in Cairo, street-car and automobile traffic is tied up at certain places every day while the river traffic moves up or down the Nile. In the level, fertile delta the railways bear little relation to the winding branches of the great Egyptian river, but from Cairo to Aswan, a distance of 550 miles, the railway hugs the river as if in fear of the flanking sands. This bridge is a few miles from Qena.

occasional patches of light ambach trees, with channels of water, pools, and lagoons dotting the swamp-scape, and here and there a sparse tree or two on the horizon. . . . In the more southerly parts are found many varieties of game. . . . Of the larger species, elephant, giraffe, buffalo, and many sorts of antelope are seen, whilst the hippopotamus is excessively numerous. (The writer counted 72 in one lagoon at Shambe.) From the reeds and mudbanks arise clouds of wild-fowl—crane, geese, storks, herons, bustard, pelicans, spoonbill, ibis, and duck of every description."

In the rainy, stormy seasons (and when the rivers have risen) these floating islands frequently change positions; here and there areas become detached from the main body and travel about, driven by the winds, often blocking the river's channel as an ice-floe might do.

Lately, spurred on by the world's paper shortage, scientists have been giving attention to the vast papyrus accumulations in the sudd, with the hope of evolving some practicable method of paper manufacture.

THE ARAB IS THE CHIEF RACIAL FACTOR IN NORTHERN SUDAN

So mixed is the native population of the Nile banks in the Sudan that it has been aptly named the "Negro Potpourri," though some ethnologists contend that these blacks are not really negroes.

Probably the Nubians, geographically and physically, are the real link between Egypt and negro-land. Though Moslems for centuries, they have kept their own dialects.

The richness of the Nile Valley has, century after century, lured so many invaders into it that to-day a veritable babel of races and tongues is found here. Apparently, the Moslem religion

Photograph by Maynard Owen Williams

WHERE EYES ARE ELOQUENT AND CHINS ARE STILL

Egyptian women have lustrous eyes, the beauty of which is enhanced by the use of kohl, for darkening the lids. With the less attractive features of her face well covered, the Moslem woman allows her large, dark orbs to speak a language of their own.

Photograph from Kodak (Egypt), Ltd.

A WOMAN FROM THE SUDAN

Many of the older Sudanese negroes in Egypt were brought thither as slaves; but they are often treated more like members of the family than menials, and there are in Egypt thousands of these voluntary exiles from the land of the sudd.

appeals strangely to the wild tribes of north Africa, and millions have adopted it. Many are carelessly called Arabs because they are Moslems, or because they can speak Arabic, or because they wear a picturesque make-up of town Arab and Bedouin garments.

"Invasion, however, is not the only disturbing element," a British military report says. "The natives of the Sudan, even when they have adopted a more or less settled life, are great travelers; traffic in human flesh and conquest for the sake of human flesh have nowhere been pursued so long and so thoroughly. The native changes his abode without hesitation, and his love of strange women is passing Solomon's.

"The real Arab appears to dominate the northern part of the Sudan, from Egypt to Kordofan, though he has nowhere exterminated the original inhabitants; he has in many cases not yet succeeded in forcing his own language on them, but he has intermarried freely with them, and the resulting mixture calls itself Arabian. It is an old saying in Egypt that you can't tell a Turk of the third generation from a native of the Nile country."

The Sudan, say the Egyptians, is an integral part of Egypt; but it was conquered, misgoverned, and lost by successive khedives, and for years and years it was exploited by Egypt for ivory, gold, and slaves. Both socially and ethnologically, it differs from Egypt.

The Sudanese do not like the Egyptians; their only common tie is that both live on the waters of the Nile. Just now, too, the project of building the new Nile dams in the Sudan is arousing much excitement in Egypt, where the fellaheen fear that they may be robbed of some of their ancient irrigation rights. And water, at best, is not always too plentiful in Egypt.

By virtue of an agreement made back in 1899, Great Britain shares the protectorate over the Sudan with Egypt; but Englishmen actually govern the country.

It is a region, apparently, of vast agricultural possibilities. If present projects are carried out, the Sudan may one day grow as much cotton as Egypt itself.

EGYPT IS AHEAD OF TURKEY

Rejoicing now in her new freedom, and with the increase of agriculture and the growth of irrigation works and railways along the Nile, Egypt is gradually assuming a more prominent place in the affairs of the world. Her new government, steered by Europeanized Egyptians, adds another non-Christian unit to the family of nations. Her long French and British tutelage undoubtedly leaves her better equipped for self-rule than either Persia or Turkey.

In education, as well as in railways, irrigation works, newspapers, and law courts, Egypt is and will be far in advance of Turkey; yet she must still lack the force and security for progress which Christianity brings. Lord Cromer once said: "The de-moslemized Moslem, although he is wholly unaware of the defect, is inferior in one respect wherein his inferiority cannot be removed by a stroke of the pen; for the civilized European, as we understand him, although he may not be an orthodox Christian, is, in spite of himself, to a great extent the outcome of Christianity and would not be what he is had he not 1900 years of Christianity behind him."

In Cairo and London, men think mainly of politics and agriculture when Egypt's affairs are mentioned. To most Americans, however, the name Egypt still means the home of the Sphinx and the whirling dervish, the land of the mummy and the scarab, a desert realm of camels and white-robed sheiks, where long ago the troubles of the Children of Israel first began.

And yet—you who know Egypt, you who have come under the spell of the Nile—you can forgive that Frenchman who wept when he saw the Pyramids!

THE LAND OF THE FREE IN AFRICA

By Harry A. McBride

Author of "The Land of the Basques," in the National Geographic Magazine

A SHORT while ago, on November 15, 1921, to be more explicit, there occurred at the Navy Yard at Charlestown, Massachusetts, an incident of note. The commanding officer and his staff, in full-dress uniforms, stood at the left of the main gate of the yard. At the right a company of marines stood at attention. An automobile arrived and discharged its passengers, who greeted the commanding officer. The marines came to "present arms," while the Navy band played a national anthem, beautiful and full of swing, yet an anthem very unfamiliar to American ears. Its title was "Hail Liberia."

Half an hour later, with the distinguished guests aboard, the United States cruiser *Denver* loosed its moorings, glided away from the pier out into midstream, and turned its bow Atlantic-ward. Its duty was to carry back to his country, in far-away Africa, the chief executive of the Liberian Republic, and at the same time to bear messages of good-will from this government to that small copy of our own institutions which the world knows as "Liberia."

President Charles Dunbar Burgess King had been in this country for several months, appointed to bring in person to the notice of Uncle Sam the appeal of Liberia for financial assistance. Liberia did not come begging with empty hands, but proposed, as security for a credit of $5,000,000, to pledge all her revenues, which in themselves are more than ample assurance of repayment.

AMERICA RESPONDS TO LIBERIA'S APPEAL

The appeal was not altogether in vain. The United States recognized the necessity, which arose because of Liberia's participation in the World War and has requested Congress to authorize the establishment in favor of Liberia of a credit of $5,000,000, secured by proper safeguards.

The Liberian plan is to use this money principally for opening up what has always been considered potentially one of the richest corners of Africa, and no one knows what hidden natural wealth will be discovered when motor roads are blazed through its jungle lands and palm forests. To-day there are no civilized settlements more than twenty-five miles inland from the coast; the vast interior is a blank, both to Liberians and to the outside world.

Immense palm forests are known to exist—greater, perhaps, in productivity than those of Nigeria and the Belgian Congo—and if no other object is attained than bringing these within reach of the needs of present-day civilization, Liberia's prosperity will be doubled and her name will jump from a bottom rung to a much higher place on the ladder of commercial nations.

PROBABLE MINERAL RESOURCES OF THE COUNTRY

Inasmuch as Liberia's neighbors, colonies of European powers, explored and developed with money from the coffers of the mother countries, have been found to be rich in gold, tin, coal, and other essential products, why not Liberia also? President King's visit, among other things, was for the purpose of having an American expert mineralogist sent to Liberia to make explorations for the government.

One day, in conversation upon the subject at the Department of State, he said:

"We want to know what we have in our country. For example, I think we have gold. I have a sample of what is believed to be gold, picked up in a certain locality in Liberia."

Putting his hand in his pocket he laid on the American official's desk a rough nugget larger than a chicken's egg, which was found to be gold of marked fineness.

One day in Liberia, while speaking to a Liberian, I also remember noticing that he was wearing a large and very beautiful diamond scarfpin made from a rough stone which was picked up in Liberia's hinterland and was sent to London to be passed upon by experts. The stone was

THE MARKET PLACE OF MONROVIA

Looking down Water Street, Monrovia's principal business thoroughfare—a picturesque place on steamer days, with its crowds of natives in bright cotton prints.

Phelps-Stokes Fund Photographs

LIBERIA COLLEGE

The college has a good location, on a hill overlooking Monrovia on one side and the South Atlantic on the other. Photograph made in connection with a tour of the African Education Commission.

Phelps-Stokes Fund Photograph

THE EXECUTIVE MANSION AT MONROVIA

The official residence of the President of Liberia, like our White House, has an "East Room."

found to be a perfect "blue-white" specimen. It would appear, therefore, that Liberia is in the position of a multimillionaire owning block after block of property on Broadway, but who finds himself in need of borrowing the necessary capital to develop it.

That the Republic should first come to America for aid is not unnatural. Nowhere in the world can there be found a foreign country so like the United States in history, language, customs, and form of government. After traveling up the West African coast, touching at ports in British, French, Belgian, and Portuguese colonies, all of which are decidedly foreign, distinctly West African, and altogether "far-away" and different in character, most Americans experience, when the slow West Coast steamer turns its nose into Monrovia Bay (see Map of Africa, B-8, issued as a supplement with this number of THE GEOGRAPHIC), a feeling of being much nearer home than the 4,000 miles which actually separates him from the nearest American ports.

The steamer, cautiously approaching the shore, finally drops anchor and awaits a brave little surfboat, pulled by twenty stalwart natives in white duck uniforms, at first a tiny speck in the huge waves churning so threateningly over the dangerous bar. This feeling of interest is intensified when the boat approaches nearer and a flag is made out at its stern, so like the Stars and Stripes as to be readily mistaken for it. The Liberian emblem, however, has only eleven stripes and one lone star.

Next the customs officer approaches—his English is decidedly American in accent—and demands that each passenger landing in Liberia prove that he has $100 in his possession. This requirement safeguards the little Republic from having to care for public charges. And he doesn't speak of pounds, francs, or pesetas, either; he says, in plain American, "one hundred dollars"—another link with home, the only place in Africa where the currency is the same as ours!

LIBERIA'S CAPITAL NAMED FOR PRESIDENT MONROE

Monrovia, the capital, named for an illustrious American President, is the

THE PLAYGROUND OF THE KRU

The Krus, who mainly occupy the Liberian littoral between Grand Bassa and Cape Palmas, love the water. They are sailor and fisher folk, and from early youth Kru boys spend most of their lives either in or on the water. They venture miles from shore in tiny fishing canoes.

Photographs from Harry A. McBride

KRU-TOWN, A NATIVE SECTION OF MONROVIA

Monrovia proper is built up the slopes of a hill (in the right foreground). Kru-town, where some three thousand Krus dwell, is on the sandy point which juts out into the bay. It supplies many deck hands and winch boys for handling the cargoes of West Coast steamers.

largest town in the Republic, and I should say that few cities in the world have a harbor so picturesque.

Nature seems to have lavished great care on this out-of-the-way tropical stopping place. Monrovia Bay is about seven miles wide, and vessels enter the harbor in the center, with Cape Mount far off toward the left and Monrovia Point, high and rocky, on the right. Between the Cape and the Point is the oval background of sandy beach and majestic palms.

Some two miles from the Point, Mesurado River empties into the Bay with a corkscrew turn around the sand-bar with which it has obstructed its own free entrance into the Atlantic. Just back of the bar, the town itself nestles peacefully on the hill rising from the river bank, with its white roofs emerging from unsurpassed tropical verdure.

Photograph from Herbert Halloway

CANOES AT MONROVIA, CAPITAL OF LIBERIA

Kru boys paddle a mile out to sea in round-bottom dugout canoes to the side of an incoming steamer. They will dive for pennies with little urging.

Because of the bar, steamers are forced to anchor a mile or more from the shore, while passengers and freight are landed in surfboats.

Often this landing is an exciting experience, and the passenger always marvels at the canny judgment of the native "headman" in choosing the wave that will be the longest and safest to "ride in on." Sometimes his twenty oarsmen will wait a quarter of an hour just beyond the powerful surf, then a wave mountain high will be seen racing in from the sea; the brawny native Krumen, clad only in loin-cloths, lift their oars and brace their bare feet against the cross-board in front of them.

The boat rises on the incoming mountain of water, the headman gives a shrill cry, and the men pull for their lives to keep the boat balanced on the churning crest. Spray flies on every side, and to the uninitiated this is apparently their last moment on earth, as the slender boat shoots, at terrific pace and at some horrible angles, over the bar.

But soon the waters become more quiet, the pace slackens, and the boat is pulled along on even keel again, perspiration glistening on the muscular brown backs of the crew.

Up and across the Mesurado River, they go past pretty little Providence Island, with

Photograph from Harry A. McBride

"JESSANDREW"

A well-known native eccentric often seen on the streets of Monrovia—a most happy individual, despite the fact that he is deaf and dumb.

its one immense baobab tree towering over a cluster of mud huts, to the Monrovia landing, half a mile from the bar. It is possible that the harrowing experience of crossing the bar has something to do with making Monrovia look so charmingly inviting.

The landing is disappointing. The wharf is small and untidy and the main business street along the waterfront—Water Street—is none too wide, none too straight, none too well paved, and none too clean.

The business premises, most of the more pretentious kept by British, French, and Dutch firms, are poor, with the first floor usually built of cement and the roof of corrugated iron. Water Street could, however, easily be made to compare more favorably with the main business centers of Freetown or Dakar.

RESIDENTIAL SECTION BUILT IN AMERICAN COLONIAL STYLE

Climbing the hill, two or three blocks, one comes to Ashman Street, the chief residential thoroughfare, which is very pleasing in aspect. The Executive Mansion, the foreign legations and consulates, the War Department Building, and the Representatives Hall lend to its importance. On this street are also several of the best residences, well constructed of brick, after the fashion of American houses of the Colonial days, with columns along the front.

The Executive Mansion is a large, white, three-story structure—and it has its "East Room."

In the reception-room are portraits of some of Liberia's presidents and the framed photograph of one foreigner. This foreigner—a hero in Liberian history—is Captain Frank H. Schofield, of the United States Navy, who, while in command of an American cruiser, quelled a native uprising on the coast a few years ago. He also landed a supply of rifles to enable the Liberian Frontier Force, a well-trained tiny army of 800 native soldiers, to keep the peace thereafter.

In Liberia, army rifles have ever since been called "Schofield rifles," and the government forms of the War Department list so many "Schofields" as being in the possession of each company.

Liberia occupies that corner of West

Africa which juts out into the Atlantic as if in an endeavor to reach across to the Brazilian shore, on the South American Continent. Only a few years ago the maps showed it to comprise a large area, extending northeastward almost to the Sahara; but the geographers themselves were unable to place definite heavy lines for Liberia's interior frontiers.

Then came the dreams of African empires by European nations, and little by little the area accredited by the map-makers to the weak little Republic has dwindled until to-day its coastline is only 360 miles in length and its frontier farthest in the interior is only 200 miles from the seacoast. Its present area, about equal to that of the State of Ohio, is one-third what the Liberians originally claimed, and their claims were probably as good as those of many of the powers which undertook the colonizing of the Dark Continent.

LIBERIAN COLONIZATION MOVEMENT BEGUN IN 1816 FOR FREED AMERICAN SLAVES

Here and there along the coast the original settlers—negro freedmen from the United States—founded little towns and settlements. They were sent from America back to the lands of their ancestors by the American Colonization Society, in which such men as President Monroe, Henry Clay, and others were interested. This movement began in 1816, and the first vessels, sailing schooners chartered by the American Government, set forth from New York in 1820-23.

Many of the first settlers succumbed to African fevers; others were killed by hostile natives. Indeed, the early efforts of these civilized Americo-Liberians to establish themselves on the African coast were not unlike those of the early colonists at Jamestown and the seekers of new homes who landed at Plymouth Rock. Finally they acquired right to certain lands by purchase from native chiefs.

How many strings of beads were paid to the American Indians for Manhattan Island? Either the purchasers of the first Liberian settlement were more liberal or the natives had better business heads. They charged and were paid quite a price—six muskets, one small barrel of

Photograph from French Colonial Office

A YOUNG BAOULE GOING AFTER WATER

He is a native of the French Ivory Coast, which lies to the east between Liberia and the British Gold Coast.

Photograph by T. C. Mitchell

IN LIBERIA'S INTERIOR, HIGH, HILLY, AND HEALTHFUL

This photograph shows the quarters of the Interior Commissioner at Zinta, not far from the frontier of French Guinea.

Photograph from Harry A. McBride

A LIBERIAN NATIVE TOWN, SET IN A SMALL CLEARING OF "BIG BUSH"

The roofs of the huts are of palm-frond thatch and the walls are of daubed mud.

A WEST COAST VILLAGE ON THE SEA, IN THE SHADE OF COCONUT PALMS

Photographs from Harry A. McBride

AFRICAN NATIVES WITH THEIR CHILDREN

In the foreground are two large calabashes used by natives for holding their drinking water.

Photographs by T. J. Alldridge

NATIVE CARRIERS WALKING SINGLE FILE THROUGH THE BUSH

Such caravans as the one shown above brought rice to Monrovia during the World War from 100 miles inland (see text, page 430).

PALM-LEAF HAMPERS USED FOR OVERLAND TRANSPORT

Though frail in appearance, these hampers are extremely strong. An average load weighs from 56 to 65 pounds.

Photograph from Harry A. McBride

BASSA BELLES "EN FÊTE"

When fête days arrive in West Africa, the natives decorate themselves instead of hanging flags and bunting from their houses. Skins are marked with lines of white clay, bushels of beads are hung on necks and shoulders, yards of anklets are taken from the "jewel chests," and strings of gold and silver coins are used as hair ornaments.

Photograph by T. J. Alldridge

A NATIVE "YENKETTI" OR SUSPENSION BRIDGE

These suspension bridges are frequently encountered by the traveler in the hinterland of Liberia and Sierra Leone. The ropes are made of fibers and the structures swing over the rivers from branches of trees.

powder, six iron bars, ten iron pots, one barrel of beads, two casks of tobacco, twelve knives, twelve forks and twelve spoons, one small barrel of nails, one box of tobacco pipes, three looking-glasses, four umbrellas, three walking-sticks, one box of soap, one barrel of rum, four hats, three pairs of shoes, six pieces of blue baft, and three pieces of white calico!

All the above was given "cash down" in part payment, but the native kings agreed to give credit for the following, which were to be paid by the colonizers when they could: Six iron bars, twelve guns (probably long Danes), three barrels of powder, twelve plates, twelve barrels of ships' biscuit, twelve glass decanters, twelve wineglasses, and forty pairs of boots.

LIBERIA HAS AMERICAN FORM OF GOVERNMENT

In 1847 the little settlements along the coast united to form the Republic of Liberia, and published to the world two documents—their Declaration of Independence and Constitution—both of which take the form of their prototypes in American history.

Joseph Jenkins Roberts was elected the first president of the Republic. He was a man of superior talents, and the first administration, though encountering innumerable difficulties, was conspicuously successful. At that time there were two political parties in Liberia—the Whigs and Republicans.

Roberts' successor, Stephen A. Benson, was elected in 1856. The first president was a mulatto, so light in color as to be readily mistaken for a white man. Benson, however, was quite black. An amusing incident at the time of the election of Benson is quoted by Professor Frederick Starr in his excellent and authentic work, "Liberia," which is to-day used as a textbook in Liberian schools.

A certain Captain White, of Virginia, met in Monrovia an old negro and former slave, whom he had known in America. The Captain asked:

"Which of the candidates for the presidency are you going to vote for?"

"Oh, Benson," replied the negro.

Photograph by T. J. Alldridge

A NATIVE INDUSTRY FAST LOSING GROUND IN LIBERIA

Formerly Liberian women wove much fine cloth from cotton that had been treated with native vegetable dyes. Cheap, bright-colored cotton prints from Manchester are gradually replacing the finer, heavier native cloths.

"Has not Roberts made you a good president?"

"Yessah," said the former slave.

"He is a very smart man," Captain White urged, "and much respected abroad; I think you had better vote for him."

"That's all true, but the fac's just this, Massa White: The folks say as how us darkies ain't fitten to take care o' oursel's—ain't capable. Roberts is a very fine gentleman, but he's more white than black; but Benson, he's colored people all over."

There are to-day less than fifteen thousand of the descendants of the original colonizers. These are the Americo-Liberians, who carry on the affairs of the Republic, control much of the commerce, and attend to the few existing industries. They have, in turn, civilized and given a certain amount of education to about 100,000 of the coastal natives. In addition to these, Liberia's population is composed of some 1,500,000 uncivilized natives who inhabit the interior regions.

Never have the Americo-Liberians penetrated far inland. Their towns are along the seacoast, and for 15 or 25 miles up the principal rivers their settlements and farms are found.

Monrovia, the capital, has a population of about 4,000. Grand Bassa and Cape Palmas rank next in order. Then come the smaller villages, and how interesting to Americans are their names: New York, Philadelphia, Virginia, New Georgia, Marshall, Bunker Hill, Hartford! But they are like American localities only in name.

Some 20 miles up the St. Paul River from Monrovia, the one motor-boat, if it happens to be running properly that day, turns sharply to the left, toward the landing place of New York.

It might be said that New York, Africa, and New York, America, form the two extremes in human habitats. At the latter, one lands from a 50,000-ton liner upon a wonderful two-story pier of reinforced concrete, and is cast ashore into the canyons between skyscrapers, into the

Photograph by T. C. Mitchell

A MOTHER OF THE BUZI TRIBE AT ZINTA

She is hanging out the weekly wash, unimpeded in her labors by her conveniently placed babe.

noisy turmoil of its 6,000,000 people. At the former, one steps carefully from the one-ton, antiquated motor-launch on to the dubious-looking single landing plank and springs ashore into the mud.

There are three cottages in view, built upon supports of bricks, which might be called bungalows if they were more carefully constructed. But New York, Africa, also has its skyscrapers—two immense cottonwood trees. It also has its turmoil—the deafening croaking of hundreds of bullfrogs.

The Liberian farmers devote themselves to coffee-growing, their product being popular in Germany and the Scandinavian countries. The bean is large and the coffee is excellent, though very strong.

Palm oil, which all Europe finds indispensable in its soap manufactories, in glycerine production, and in other industries, and the demand for which is rapidly growing in the United States, is produced by the natives and forms a remunerative export, which could be vastly increased if means of transportation from the great palm forests were made available.

Piassaba is the third product of importance—a strong palm fiber from which the brushes for rotary street-sweepers are made.

ROADS TO THE INTERIOR ARE ESSENTIAL TO LIBERIAN PROSPERITY

None of these exports can be increased appreciably until the interior regions are tapped. There is only one way to accomplish this and to add to Liberian products such material wealth as may be found hidden in its jungles.

The vital need is roads. To-day the only way of sending a bundle of palm nuts from Kolahun, on the northern boundary of Liberia, to the coast is on the head of a naked native. He will walk for days on narrow native paths, wandering in all directions, wading streams, covering 300 miles, whereas a straight road 200 miles in length is what is needed, with motor-trucks to deliver produce from the northern boundary on the piers at Monrovia in 24 hours. And that is why the Liberians were so desirous of borrowing money.

The enthusiasm for road-building already exists. Two years ago, when the writer was residing in Liberia, the "road talk" began. Monrovia, however, was a difficult locality from which to start a thoroughfare into the interior, because it is built on a high point overlooking the Atlantic and is surrounded on three sides by the ocean and the wide rivers flowing into it.

The only direct way would be to build a bridge over three wide rivers; and such

a bridge would have to be as long as the Brooklyn Bridge. One hundred dollars, due to the adverse financial situation caused by the war, represented the total sum available for road-building at that time, and it was decided that this would fall somewhat short of the cost of construction of a second Brooklyn Bridge.

JUNGLE ROADS BUILT UNDER DIFFICULTIES

Extending for 15 miles along the Atlantic was a strip of land densely covered with jungle growth and paralleled by a river which degenerated here and there into mangrove swamps. At the end of this river is a town called Paynesville.

Now, the problem was to get a road to this town by hook or crook, because, once there, a good motor-road could be readily constructed into the interior. Nothing daunted by the appalling lack of funds, the Liberian Government decided to make a start at least. Two or three British and Dutch merchants volunteered to lend a dozen axes and shovels, and a British firm also lent the most important factor—a small American automobile.

At the time, forty prisoners were idling their time away and eating immense quantities of costly rice. The axes and shovels were placed in their hands and they were told to cut a straight path 21 feet wide through the jungle. Some one made a nice guess as to the direction this path should take, and a fortunate one, because it just skipped the swamp land on the north and a lagoon on the south.

The only way to tackle the problem was by guesswork, because the jungle was so thick that none could tell, in the absence of skilled engineers, what lay ahead until the great trees and undergrowth were chopped away. Huge boulders of rock would come to light,

Photograph by T. C. Mitchell

BRIDGE OVER THE ST. PAUL RIVER

This is another type of bridge constructed by natives in northern Liberia—logs tied together with native ropes and floated on the water's surface.

Photograph by T. J. Alldridge

ASCENDING AN OIL PALM TO CUT DOWN THE CONES OF THE PALM NUTS

The oil palm is probably Liberia's greatest natural resource. Forests of this tree are extensive along the coast and in the northern hinterland. Palm oil is used in enormous quantities in Europe and the United States in the manufacture of soap and in the tin-plate industry. It is also an important article of food among West African native tribes, "palm-oil chop" being one of the few native dishes which have been adopted by European and American residents.

often in the exact center of the roadway. No tackle, chains, or tractors were available; so great fires were built in trenches dug around the rocks, heating the stone until it cracked and, piece by piece, could be removed.

A four-mile stretch of soft sand was encountered, which had to be given a covering of gravel and clay; but no wheeled vehicles were on hand, not even a wheelbarrow. The merchants again came to the assistance of the road workers and contributed 40 empty kerosene boxes about the size of a bushel basket. The next day a line of 40 natives commenced to move from the gravel and clay pits toward the sandy stretch, each with a bushel box of heavy earth on his woolly head.

At the end of three months the roadway, over which an automobile could pass in a not too uncomfortable manner, was 12 miles long and only three miles from its objective, Paynesville.

A Kru boy chopped down another towering palm tree, a Bassa man felled another; then the Kru boy crawled through the tangled undergrowth to get at the next one, but his jaw dropped and he muttered the Bassa word for "damn." There was no tree, but the right of way in front of him took a sudden drop, and the bottom thereof was a deep, swift little river, and the Kru boy knew that that "puck-a-puck wagon," the automobile, could not swim. It looked as if the road would end right there.

SPIRIT OF PROGRESS DISPLAYED IN ROAD-BUILDING

But the Liberians were determined that the road should reach Paynesville. A search was made and under an old customs building were found six I-beams, each fully twenty feet long. They were very old and rusty, but still serviceable.

The beams were carried the 12 miles, each on the heads of 10 natives. The British merchant also made a search and found a barrel of cement in fair condition. The "puck-a-puck wagon" carried it to the scene of operations. Rocks were cut, and in a few days a solid little bridge spanned the stream.

Another month and Paynesville turned out en masse to welcome the entry of the first automobile that had ever spilled oil on its earthen streets, and, as a matter of fact, of the first wheeled vehicle of any sort that had ventured thither from anywhere.

The road had cost $75 for rice for the laborers, plus $15 for the services of a mason for bridge-work. A half dozen motor-trucks employed thereon for a few weeks would make it a fine motor-road.

I mention this only to show that the Liberians have come to that point where they are determined to develop their country. The natives in the interior have also come to understand the need for roads, and native chiefs have constructed little bits of roadway here and there between their towns, having no other tools for this work than sharpened sticks.

LIBERIA'S COMMERCE DESTROYED BY WORLD WAR

Liberia, it must be remembered, though having no personal grudge against Germany, entered the World War with the Allies. The German traders were expelled, and this caused a great decrease in trade. Next, the submarine campaign in the North Atlantic became so fierce as to cause the withdrawal of many West African steamers. And this is what the war did to Liberian commerce: In 1913, 1,322 vessels, with a tonnage of 2,690,178 tons, entered and cleared at Liberian ports; in 1918 the number of vessels was 127, with a tonnage of 333,926!

Also, in 1913, almost half a million dollars were collected in customs revenues, and in 1918, $165,999. At that rate, there was very little chance for progress.

Not only in trade did the war cause Liberia to suffer, but Germany sent a submarine far from the beaten paths to bring home to Liberians the stern realities of war. Monrovia was bombarded, Liberia's only remaining seagoing vessel sunk, lives lost, and property ruined. As a matter of fact, had it not been for the war, Liberia would not be in its present position of financial need, but would be more than able to carry on by herself the work of development which is so greatly desired.

Although the Americo-Liberians barely hold their own in the matter of increasing population, the million and more natives are flourishing and gaining in numbers.

Photograph by T. J. Alldridge

NATIVE WOMEN EXPRESSING PALM OIL BY BOILING THE NUTS IN CAULDRONS

This method produces the clearest oil, but many natives use the easier method of storing the palm nuts in a hole in the ground and waiting until the oil leaves the nut by decomposition of the pericarp.

These natives of Liberia may be roughly divided into the three principal races—the Mandingos, the Krus, and the Kpwesis.

THE VAI ARE HIGH TYPE NATIVES

The foremost tribe of the Mandingo race is the Vai, inhabiting the eastern part of Liberia. The Vai are lighter in color than the other natives, are proud, aggressive, and very industrious; their industries, as a matter of fact, render them practically independent of their neighbors. Their religion is Mohammedan, brought down indirectly from the Arabs in the north; their boys are taught to read Arabic and the Koran.

Vai villages are models of cleanliness, the little streets of beaten earth being swept daily; and their homes are so pretentious for native Africans that the word "hut" is scarcely applicable to them. Bamboo frames about seven feet high are first erected and then plastered with clay-like mud to a thickness of about twelve inches, the outer coat being flung onto the building by hand, so that it resembles stucco.

The pointed circular roof is of neatly thatched grass and palm fiber. There is one door in the front and, often, several windows—an unusual feature in native architecture.

The Vai weave a very heavy cotton cloth, beautifully colored by native dyes, usually in stripes and geometrical designs. From this cloth they make long, loose robes of dark blue, which constitute the principal article of attire of the Vai men and correspond to the loose white robes worn by their Arab brothers farther north.

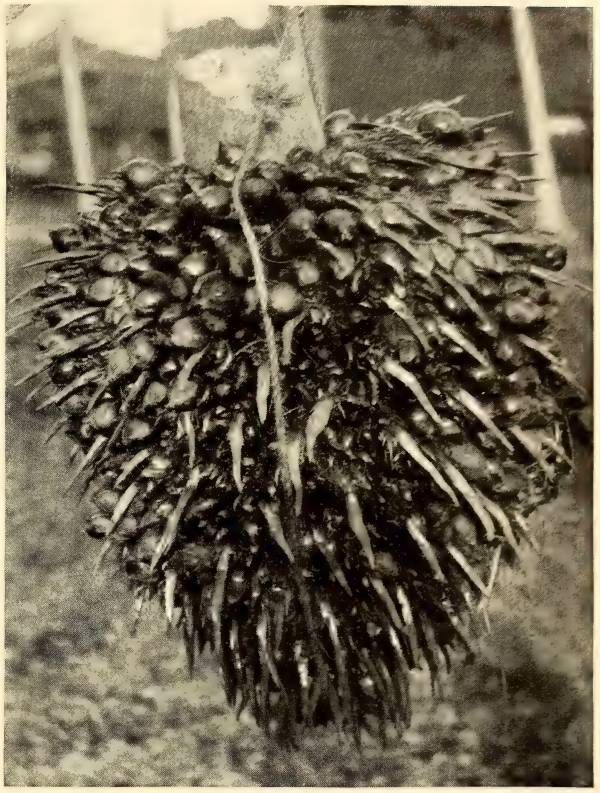
THE KRUS ARE THE CHIEF TRAVELERS OF AFRICA

From the cloth they also make attractively colored and comfortable hammocks in which they sleep, whereas most other natives sleep on reed mats spread upon the ground.

The Vai is intellectually clever to a marked degree, and has one of the few written languages in native Africa, the syllabary of which, slightly resembling Arabic in appearance, is so complete as to make it an interesting study for the visitor.

The Krus inhabit the coastal regions from Monrovia as far east as Cape Palmas. They are decidedly different from the Vai peoples, being darker in color and not so tall in stature. They are willing workers and constitute a valuable asset to Liberia at the present time, when so much labor is needed for development of all kinds.

For ages the Kru has been the laborer of the coast, but his chief occupation has been that of sailor and fisherman. He is the most traveled of all the Africans; every steamer plying along the West



Photograph by T. J. Alldridge

AN OIL PALM CONE

This cone of fresh fruit, cut from under the fronds at the crown of the oil palm, weighs 56 pounds and contains 1,445 serviceable oil palm nuts. The core of the cone is used by the natives in preparing a powerful black soap.

Coast touches first at a Liberian port to take on a hundred or so Kru boys.

These sturdy fellows take charge of loading and unloading all the cargo at the little ports down the coast as far as Loanda, and are then brought back to Liberia, paid off, and sent ashore to await the next southward-bound vessel. This practice has been found necessary because of the impossibility of white crews "working" the cargo in the terrific tropical heat.

PHONOGRAPHS AND SEWING-MACHINES IN KRU HUTS

The purser in signing the Kru boys on the ship's articles gives them names which he can spell and pronounce. Generally the Kru boy is very proud or his sailor name, using it forever after. Thus one should not be surprised to find a Kru seaman bearing the appellation Bill Tobacco, Bottle Beer, Fifteen Cents, or perhaps Soap Box.

One of the largest Kru villages is Krutown, on the riverside near Monrovia, where some three thousand of these sailor folk and their families live. Due to their industrious ways, they, of course, have more money than other natives, and hence their huts often boast phonographs and sewing-machines, and their attire includes several, if not all, of the necessary articles of European dress. The Kru seaman insists, however, upon wearing the European shirt outside the trousers.

Kru homes are built by erecting four posts, one at each corner, and fastening between them large mats woven of bamboo splits. Grass and palm branches form the roof, and there is a small entryway at one corner, but usually no window. The village is always gay and happy with native dances going on to the thumping of tom-toms in the rear of the huts.

THE KPWESIS ARE LIBERIA'S BUSHMEN

Another trait of the Krus is patriotism, their love of country being so great as to render almost fruitless efforts to induce these valuable laborers to settle and remain in neighboring British and French colonies.

The third element, the Kpwesis, and kindred pagan tribes of the interior, of which the most important branches are the Zawquellis and Buzis, are still primitive "bushmen." They are slender, wiry, very black in color, and of a low order of intelligence, having petty jealousies, which frequently lead to internecine warfare.

They live in small villages, usually of only fifteen to thirty huts, and raise sufficient rice, sweet potatoes, and cassava for food. Each male has as many wives as he is able to buy, and the wives do most of the work.

Yet these are the tribes that inhabit the regions where lies Liberia's natural wealth; they are the ones who must be brought into contact with the coastal tribes and who must be taught to produce and to supply the palm nuts, palm kernels, palm oil, ivory, piassaba, rubber, and other articles of trade.

They are not entirely unwilling to assist the government. During the last year of the war, when steamers from Europe were few and far between, there was a great scarcity of rice for feeding the frontier force.

The price of the imported article was twelve cents per pound—more than the government could afford to pay. Word was sent far into the interior to a certain Kpwesis chief. He answered the call by sending a caravan of two hundred of his tribesmen to Monrovia—a distance of 100 miles—on foot, every man carrying on his head a parcel of 56 pounds of native rice carefully packed in palm-leaf hampers.

Each of these carriers was given a Liberian dime and a piece of cotton print for his labor, and they returned highly contented to their villages. This rice cost the government about two cents per pound, and the first caravan was only the forerunner of others.

Liberia, therefore, possesses the natural resources. The will to develop them also exists. These factors should create a new era in this African country, especially if Liberia's appeal for financial aid is successful. A change for the better, development along sound lines—these are things that should take place in the Republic.

Photograph from South African Railways

TWIN ENIGMA TO EGYPT'S SPHINX: ZIMBABWE, SOUTHERN RHODESIA

The ruins of the Great Zimbabwe, near Victoria, Southern Rhodesia, are as yet an unsolved puzzle to men of science. Some believe that the great pile was an ancient temple. Others consider it merely a kraal fortress, of Bantu design and construction, of the fourteenth century. This view shows a passage between walls 30 feet high, constructed of small cubes of hand-tooled granite.

JUNGLE PIANOS OF ANGOLA, PORTUGUESE WEST AFRICA

The quality of music produced by these instruments, with resonators made of gourds, is similar to that of our own xylophones and of the Guatemalan marimba.

© Publishers' Photo Service

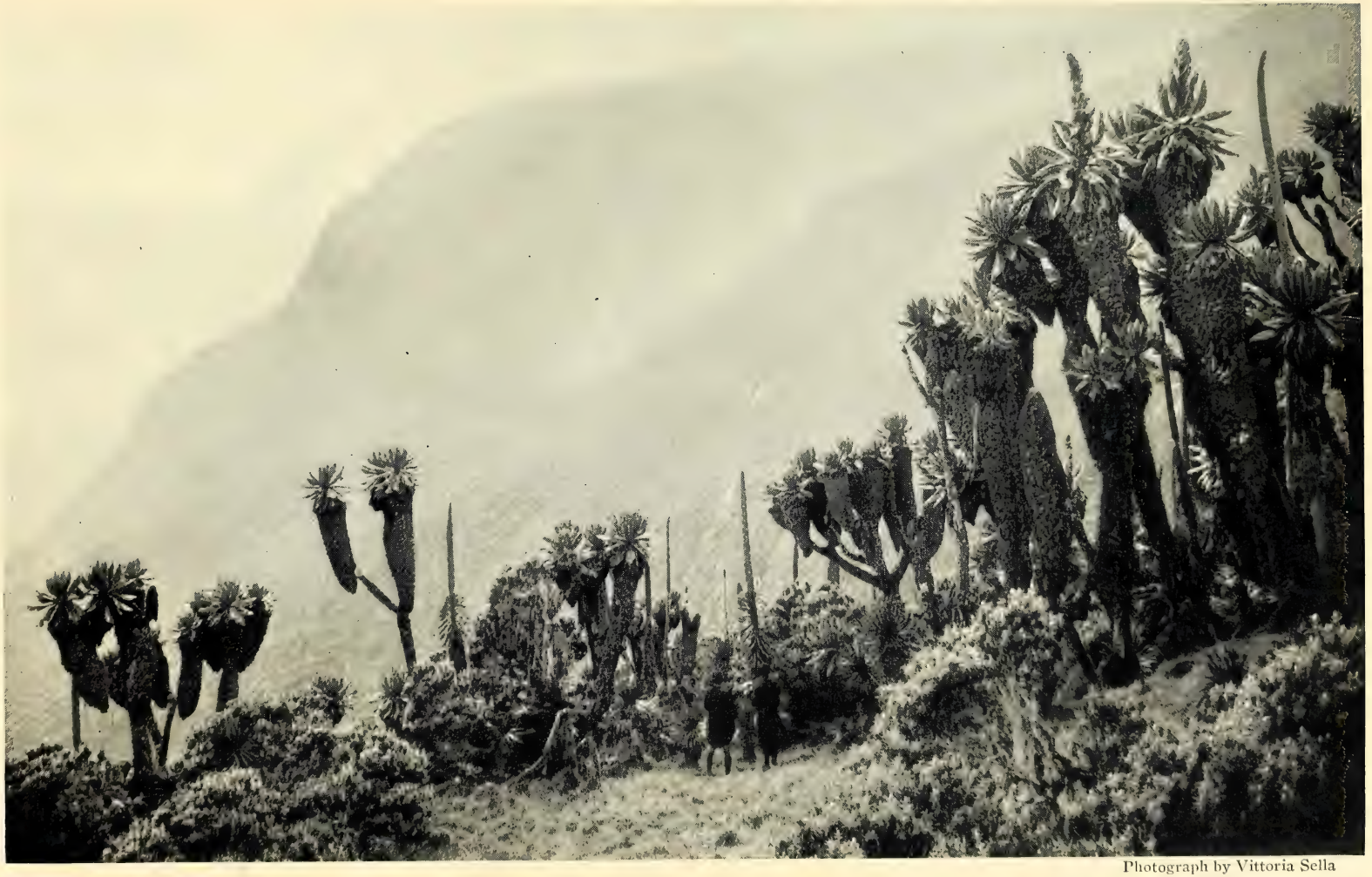
LOADING IVORY AT MOMBASA, KENYA COLONY

Africa furnishes most of the ivory for the billiard balls, piano keys, knife handles, and toilet articles of the world. Less than one-fifth of the ivory now being exported comes from animals recently killed. This is known as live ivory. Dead ivory is from native stores accumulated during many years or from tusks found in mysterious jungle hiding places where elephants have died.

Photograph by Vittoria Sella

MARGHERITA PEAK, THE LOFTIEST POINT OF MT. STANLEY, OF THE RUWENZORI RANGE, EQUATORIAL AFRICA

Mt. Stanley, 16,815 feet in height, is the loftiest summit of the Ruwenzori Range, a mountain mass 65 miles long and 30 broad, between Lake Albert and Lake Albert Edward. The pinnacle, named in honor of Queen Margherita of Italy, was first climbed by the Duke of the Abruzzi. Cavaliere Vittoria Sella, the distinguished Alpine photographer, accompanied the expedition and obtained these wonderful pictures.



Photograph by Vittoria Sella

SENECIO TORCHES AND LOBELIA CANDLES ON THE SLOPES OF RUWENZORI

Who would recognize in the candle-shaped *Lobelia Stuhlmanni* a close relative of the common cardinal flower, or in the top-heavy *Senecio Adduralis* a member of the same numerous family as the golden ragwort? The genus senecio numbers 1,000 species.

Photograph by Vittoria Sella

MOUNTAIN-CLIMBING IN CENTRAL AFRICA

Members of the expedition of the Duke of the Abruzzi crossing the ridge above the little village of Bihunga, which had earlier been the base for the British Museum Expedition. Bihunga is only 6,300 feet above the sea, with the loftiest peak of Ruwenzori 10,500 feet higher up.

Photograph by Vittoria Sella

TROPICAL COUSINS OF OUR FAMILIAR "INDIAN TOBACCO"

There are more than two hundred species of the lobelias, several varieties of which flourish in the midst of the heath forest on the slopes of Ruwenzori. The tree heaths grow to an altitude of 12,500 feet and are related to the heather of the Scottish Highlands.

Photograph by Vittoria Sella

TROPICAL FOREST IN THE HEART OF AFRICA

As Mt. Stanley towers above the African plateau, so this giant tree, emulating the mountain on whose slope it grows, has risen head and shoulders above its fellows.

Photograph from South African Railways

HOME OF THE SOUNDING SMOKE: VICTORIA FALLS, RHODESIA

Musi-oa-tunya, "Smoke does sound there," is the native name for this queen of waterfalls, which is more than a mile wide and from 256 to 343 feet high.

© Publishers' Photo Service

A SAUSAGE-TREE AND PLATEAU LANDSCAPE NEAR LAKE VICTORIA

Lake Victoria, the reservoir of the Nile, discovered by J. H. Speke in 1858 and by him named in honor of his queen, is the second largest lake in the world. Its altitude of 3,720 feet, coupled with its vast expanse, into which most of Scotland could be placed, makes it easily one of the most interesting inland bodies of water.

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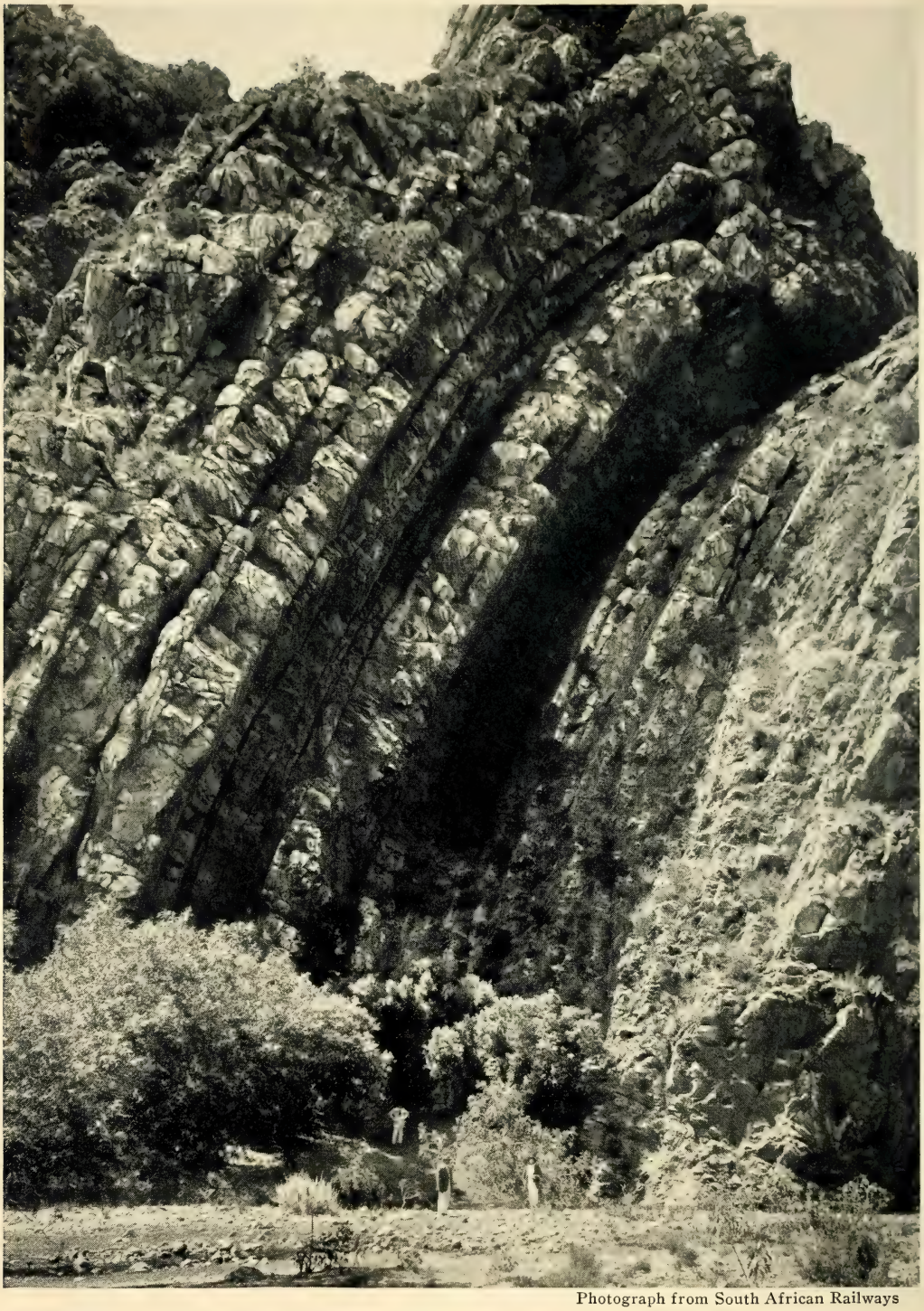
GUANO-PRODUCERS ON THE SOUTHWEST COAST OF AFRICA

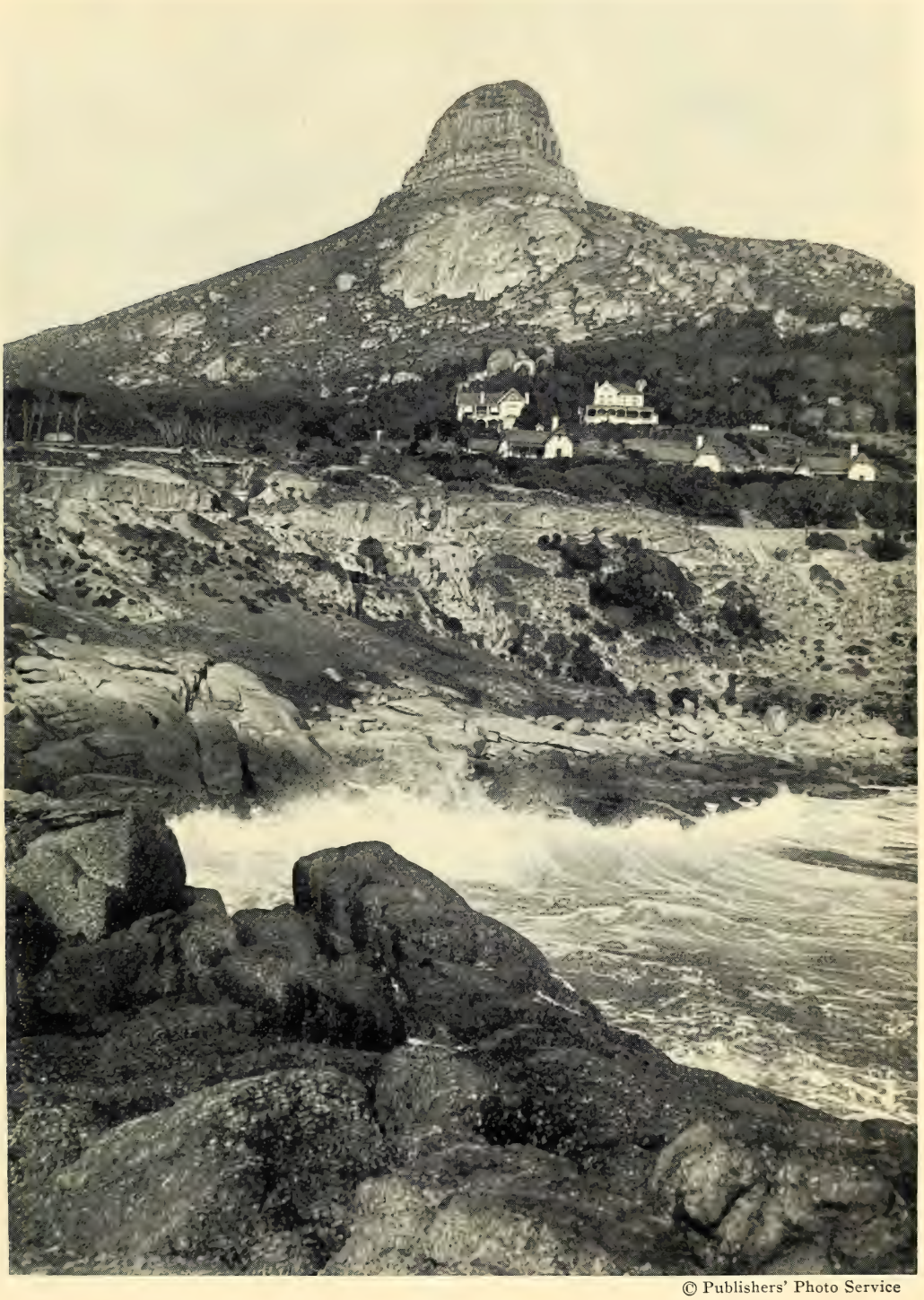
The gannet, or solan-goose, is widely known, not only as a producer of guano, but also for its ability to spy out shoals of herring and other fishes upon which it feeds. Note the indifference of these birds to the photographer in the foreground.



Photograph from South African Railways

A MIX-UP IN THE AFRICAN STRATA: CAPE OF GOOD HOPE PROVINCE

The distinguishing feature of African geography is its freedom from complex structures. South Africa is largely a table-land, reached by three steps from the sea, and such up-ended strata are not frequently met with.



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LION'S HEAD, ONE OF THE GUARDIANS OF CAPE TOWN

Table Mountain (seen in the illustration on page 444) is not the only remarkable landmark of the seat of administration of the Cape of Good Hope Province. To the east rises Devil's Peak and to the west Lion's Head.

© Publishers' Photo Service

CAPE TOWN OCCUPIES AN IMPRESSIVE STAGE

To the right is Table Mountain, 3,500 feet high, a noble scenic background for a fine modern city. The two wings of the setting are Devil's Peak, on the left, and Lion's Head, from which this picture was taken (see page 443).

Photograph by O. W. Barrett

A ZULU WEDDING DANCE IN A NATAL KRAAL: SOUTH AFRICA

The women may be seen behind the line of dancers, where they are keeping time to the vocal music. They are seldom permitted to dance with the men.

Photograph from South African Railways

PULPIT ROCK IN BAIN'S KLOOF: PROVINCE OF THE CAPE OF GOOD HOPE

Cape Colony was founded by the Dutch in 1652, and on May 31, 1910, was merged in the Union of South Africa, thus becoming one of the original provinces of the Union. The pass is named after Andrew Geddes Bain, one of the great road-builders of the Colony.

THE SOCIETY'S NEW MAP OF AFRICA

WITH this number of the NATIONAL GEOGRAPHIC MAGAZINE the National Geographic Society issues the fourth of its series of continental maps, compiled and published since the World War. This New Map of Africa supersedes the smaller map issued by The Society several years ago.

The areas on that continent affected by the Treaty of Versailles are even more extensive than those so affected in Europe, so that the student of geography finds it necessary to reconstruct completely his ideas concerning African colonial possessions.

More than a million square miles of territory in Africa—one-eleventh of the entire continent—belonged to Germany in 1914. To-day, these vast regions are being administered under mandates exercised by Great Britain, France, and Belgium.

The new map shows that, as a result of the World War, the French have added to their control mandated areas considerably larger than all of France in Europe. The Tricolor now flies over more territory in Africa than does that of any other nation, French colonies, protectorates, and mandates having an aggregate area which exceeds by nearly 80,000 square miles that of the entire United States, including Alaska and all our insular possessions.

The map shows more than 735,000 square miles of territory transferred from German sovereignty to British mandates (413,000 square miles to Great Britain proper, and 322,000 square miles to the Union of South Africa). From the Empire's territorial accretions, however, must be deducted the 350,000 square miles which until recently constituted the British protectorate in Egypt.

It is interesting to note that only three countries in Africa—Liberia, Egypt, and Abyssinia, with a bare 741,000 square miles of territory—are independent. The remaining millions of square miles of the second largest continent, comprising more than one-fifth of the earth's land surface, are ruled by European nations.

The acquisition of colonial territory in Africa took place, in the main, during the last quarter of the nineteenth century. At the beginning of that century, France had a foothold on the west coast near the Senegal River; Portugal was established in lower Guinea, on the west coast, and in a small district opposite the island of Madagascar, on the east; while Great Britain's chief interest lay in Cape Colony, which had been taken from the Dutch during the Napoleonic wars.

The explorations of such men as Livingstone and Stanley, Rohlfs and Du Chaillu, during the last half of the nineteenth century, fired the popular imagination and brought about that awakening of public interest in the Dark Continent which caused a "scramble" for colonies between 1875 and 1900.

Germany did not embark upon a colony-acquiring policy until 1882, when a Colonial Society was formed to promote lectures and to establish a colonial museum in Berlin. Bismarck was won over to the scheme and German traders began to establish stations along the west coast of Africa.

One of the most active agents in Germany's colonial enterprise was a Bremen citizen, Herr Lüderitz, who acquired, by treaties with natives, a small area around Angra Pequena on the west coast, north of the Cape Colony settlement. He demanded German protection; Bismarck granted it, and in 1884 the German flag was for the first time authorized to fly over colonial property in Africa. Lüderitz's name is perpetuated in that of a small town on the coast (see H-15).

Next came acquisitions in Togoland and the Cameroons. In 1885 Germans were active on the east coast, making treaties with tribal chiefs for an enormous tract of land embracing 200,000 square miles, known subsequently as the protectorate of German East Africa.

HOW THE GERMAN HOLDINGS HAVE BEEN CONVERTED

To the Union of South Africa has been entrusted the mandate over German Southwest Africa; Great Britain has fallen mandatory heir to German East Africa, now known as Tanganyika Territory, to a strip of Togoland (13,514

square miles) lying on the east bank of the Volta River and to a portion of the Cameroons (34,750 square miles) bordering on her possessions in southeastern Nigeria.

France has assumed the mandate over the major portions of Togoland (20,154 square miles) and the Cameroons (270,270 square miles).

Belgium's share in mandate responsibilities over Germany's former African colonial empire consists of the territory lying between Lake Tanganyika and Lake Victoria, known as Ruanda and Urundi—some 19,000 square miles.

The territorial interests of European countries in Africa since the mandate adjustments are represented by the following statistics:

France, 4,474,000 square miles—more than twenty times the area of the home country; Great Britain, 3,854,600 square miles—more than thirty times the area of the British Isles; Belgium, 928,900 square miles—more than eighty times the area of the governing country; Portugal, 927,200 square miles—equal to twenty-six Portugals - in - Europe; Italy, 591,200 square miles—more than four times the size of the governing country; and Spain, 128,100 square miles—about two-thirds the size of the home land.

One of the most interesting features of the New Map of Africa compared with that published by The Society several years ago is the remarkable development of the continent's railways. The lines under construction are being completed so rapidly that on two occasions during the publication of the Map, which required three months, it was found necessary to stop the presses and change the lines from "proposed" to "finished" railroads.

In several instances, the boundaries between colonial possessions have not yet been fixed definitely. In such cases the tentative or approximate lines are shown by broken color lines, as, for example, between French West Africa and Italian Libya and between Italian Libya and Egypt. The boundary between Italian Somaliland and British Kenya is also in the course of amicable adjustment.

In the spelling of native place names, the British transliteration system has been adopted, but a key has been provided (in the Note in the lower right corner of the Map), which will enable the student to obtain the French, Belgian, Italian, and Portuguese equivalents of the English sounds.

OTHER MAPS IN PREPARATION

The Map of Africa will be followed in the near future by a Map of the World, drawn on a newly-devised projection, which shows the Western Hemisphere practically without distortion. Later will appear a splendid Map of the United States of convenient size.

The maps already published by The Society and issued as supplements with the NATIONAL GEOGRAPHIC MAGAZINE during 1921 and 1922—Europe, Asia, South America, the Islands of the Pacific, the Countries of the Caribbean, and Africa—represent an expenditure for compiling, engraving, and printing of more than $200,000.

In the compilation of data for the Map of Africa The Society wishes to acknowledge its appreciation of special facilities placed at its disposal by and valuable advice received from the Map Division of the United States State Department, the Graphic Section of the Army War College, and members of the American Consular Service stationed in Africa.

REGARDING ADDITIONAL COPIES MAP OF AFRICA

Additional copies of the Map of Africa are obtainable from the headquarters of the National Geographic Society, Washington, D. C., only, at $1.00 each on paper, and $1.50 printed on linen map paper; maps in color of the New Europe (30 x 33 inches), Asia (28 x 36), South America (25 x 35), Islands of the Pacific (19 x 25), and Countries of the Caribbean Map (42 x 23½) at the same prices.

N D I A N
O C E A N
10
5°
11
10°
12
SEYCHELLES IS. (Br.)
Victoria
MAHE I.
AFRICAN IS.
AMIRANTE IS. (Br.)
ST. JOSEPH I.
MARIE LOUISE I.
ALPHONSE I.
ST. FRANCIS IS. (Br.)
ALDABRA IS. (Br.)
ASSUMPTION I.
MENAI I.
COSMOLEDO IS. (Br.)
ASTOVE I.
ST. PIERRE I.
PROVIDENCE I.
CERF I. (Br.)
FARQUHAR IS. (Br.)
GLORIOSO IS. (IS. GLORIEUSES)
Ambavanibe Bay
Courrier Bay
C. Amber (C. d'Ambre)
Diego-Suarez (Antsirane)
C. St. Sebastian
William Pitt Bay
Ambaro Bay
Mt. d'Ambre 1480
Ambilobe
Manambato
Vohémar
NOSI BE
Hellville
Ambaliha
Ambanja
Mahanara
JOHANNA I. (I. ANJOUAN)
MAYOTTA I. (I. MAYOTTE) (Fr.)

MAP OF AFRICA

AND ADJOINING PORTIONS OF EUROPE AND ASIA

PREPARED ESPECIALLY FOR

THE NATIONAL GEOGRAPHIC MAGAZINE

GILBERT GROSVENOR, EDITOR

REFERENCES:

- Railroads finished
- Railroads proposed
- Caravan Routes
- Capitals
- Deserts
- Rivers (Perennial)
- Intermittent Streams
- Unexplored Rivers
- Falls or Rapids (Ct.)
- Swamps

Legend:

- British
- French
- Italian
- Portuguese
- Spanish
- Belgian
- Independent States
- Adjoining portions of Europe and Asia

Mandated Areas are shown by colored stripes.

Elevations are given in English feet.

Scale 0 100 200 300 400 500 English Statute Miles

Scale 0 100 200 300 400 500 600 700 800 Kilometers

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Engraved and Printed at The Matthews-Northrup Works, Buffalo, N. Y.

NOTE—The British transliteration system has been used in the spelling of native names, and in expressing the English sound equivalents of the French, Italian and Portuguese spellings in their respective colonies.

The English equivalents for sounds, as applied on this map, are as follows:

In French and Belgian dependencies: w before a vowel=oo; in other cases u=oo; u ending a name=ew; j=zh; ch=tch; sh=ch; gi gui; ge gue; s=ss.

In Italian dependencies: w before a vowel=u; k before e or i=ch; sh=k before e, o, u or; ny=nh; j=y; x=sh; g=j; s between vowels=z.

In Portuguese dependencies: w before a vowel=v; k before e or i=qu; k before a, o, u or; ny=nh; j=z; x=sh; g=j; s between vowels=s.

Translations

Ain	Spring	Dorp	Village	Kop	Hill	Spruit	Spring, Stream
Areg	Dune Region	Drift	Ford	Kraal	Native Village	Stad	Town
Bahr	River	Fontein	Spring	Kuil	Pit or Gap	Stroom	Stream
Bir	Deep Well	Hamada	Rocky Plateau	Nek, Poort	Opening	Veld	Open Plain
Bosch	Bush	Hasi	Well	Ras	Cape	Vlei	Hollow filled with water in rainy season
Bu	Father	Karoo	District	Rust	Rest		
Daal	Valley	Kubr, Kasr, Kosr	Fortification	Sebkha	Salt Marsh	Wadi	Periodical River
Dhia	Marsh Land			Shott	Salt Lake		

Vol. XLII, No. 5 WASHINGTON November, 1922

THE NATIONAL GEOGRAPHIC MAGAZINE

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ADVENTURING DOWN THE WEST COAST OF MEXICO

By Herbert Corey

Author of "Across the Equator with the American Navy," "On the Monastir Road," "Andorra, a Unique Republic," etc., in the National Geographic Magazine

With Illustrations from Photographs by Clifton Adams, Staff Photographer, National Geographic Magazine

WE TRAMPED about Nogales on the score of little errands that always precede the entrance to a new country. Before starting down Mexico's west coast we had things to buy, passports to be seen to, and men to talk with.

Our manners began to improve. Before we knew it, we were beginning our speeches with "Señor" instead of "Hey!" We became addicts of hat-tipping. When we said good-bye to an official, we lifted our hats at his desk and shook hands. He followed us to the door and shook hands again. In the street we turned once more and lifted our hats.

Before we left Mexico our inherent manliness had become so softened and perverted that we formed the habit of bowing when we entered a restaurant or railway car:

"Permit us?" we asked.

The person nearest the door would smile and murmur the permission. It did not mean anything, of course. We knew all the time that he was helpless. He could not have kept us out. But, somehow, the little courtesies lessened the friction of traveling in a strange country.

Our better selves kept telling us that this politeness was an evidence of Latin insincerity. We knew that our occasional hosts did not mean it when they told us that their houses or horses or spurs or blankets were ours. Yet it broke down our resistance. Long after I returned to New York I found myself saying, in sheer absent-mindedness, to a bus conductor:

"Thank you."

"What for?" he very naturally asked. "I didn't do anything for you."

It seems time to lay more secure bedplates for this article. The reader has the right to know where we were going and why. Rejoicings over manners must no longer be permitted to sidetrack informative matter, but I must have my enthusiasms. One wanders in Mexico in a sort of a haze of history and tradition, and gold and pearls, and opulent futures and blood. It is wholly entrancing.

LEGENDS AND STORIES OF LOST MINES

My own emotional indulgence was in listening to the stories of lost mines. Every one on the coast seems to have at least one lost mine. Some rest on tradition only, while others have a sure documentary foundation.

There is the tale of the mine near Arispe, for instance, the entrance to

THE RETURN OF THE CHARRO

Ten years ago this typical charro costume was rarely seen in Mexico, except in the more distant places, where the influence of the early Spanish conquerors was still strong. Now there are several flourishing charro societies, the purpose of which is to revive the use of these picturesque old-time costumes.

THE FAMILY CHICKEN COMES TO TOWN

The Mexican Indian lives upon a margin unbelievably narrow to more fortunate folk. In the picture the man has brought one chicken to the city market. He may have walked a dozen miles to sell it. He will sleep uncomplainingly on the cold stones under an archway and he will not go home until he has sold the fowl. The few pennies obtained for it will establish the domestic exchequer on a firm, if impermanent, foundation.

Drawn by James M. Darley

THE WEST COAST OF MEXICO

"The nine States of Sonora, Sinaloa, Nayarit, Jalisco, Guerrero, Colima, Michoacan, Oaxaca, and Chiapas rim the Pacific coast-line, while Durango corners over the Sierra Madres, so that it may be considered a west-coast State" (see text, page 453).

which was concealed by the Spanish friars just before they were wiped out by a reversion of their converts to ancient form.

A century or so later a searcher in the monastic archives in Madrid found the story. By this time the very existence of the old mine had been forgotten. "One can see the opening of the tunnel from the door of the church," the priestly writing ran.

Scores of prospectors took sights from the doorway without success. Then a bit of plaster fell away from an old wall and revealed a forgotten door, bricked up and covered over.

The one old-timer who remembered the legend brought out his glasses and searched the hills. Sure enough, far up on the side of a canyon he saw something which seemed worth investigating. It was the gateway to the lost mine.

THE WEST COAST HAS BEEN SOMEWHAT IMMUNE TO POLITICAL FEVERS

The west coast of Mexico is approximately two thousand miles long, from Tiajuana, on the United States border, to the river Suchiate, below the Isthmus of Tehuantepec, which marks the border of Guatemala.

For a great part of this length it is cut off from the central portion of Mexico by the Sierra Madres. There are plenty of passes, of course, but the barrier exists.

As one consequence of this partial isolation, the west coast relationship to the United States is somewhat closer than is that of the remainder of Mexico. Amer-

ican goods can be transported easily to the west coast, either by sea or by land, while in return the agricultural products of the coast find a ready market with us.

That mountainous wall has insured the western coast a partial immunity, likewise, from the high political fevers that have from time to time ravaged the rest of the land.

The nine States of Sonora, Sinaloa, Nayarit, Jalisco, Guerrero, Colima, Michoacan, Oaxaca, and Chiapas rim the Pacific coast-line, while Durango corners over the Sierra Madres, so that it may be considered in part a west-coast State.

The peninsula of Lower California—almost as large in itself as is the mainland of Italy down to the heel of the boot—lies across the Gulf of California, which is one of the largest gulfs in the world, and must be considered a part of the entity known as the west coast.

Mexican statistics are either non-existent or unreliable, but it is safe to say that the west coast as outlined contains almost one-half of the superficial area of the Republic of Mexico and fully one-third of the Mexican population. Yet comparatively little is known of it. Revolution, politics, oil, and ease of access have directed attention toward the central portion and eastern half of the country.

GRIM SPANISH ADVENTURERS WERE MEN OF HIGH COURAGE

One starts down the west coast through the State of Sonora. If one is not a seasoned traveler the first impulse is to turn back. This enormous expanse of blowing sand, white rock, and burning sun is depressing unless one has a little history, a little imagination, and some liking for the desert.

Sonora is the second largest State in Mexico and one of the richest mining districts in the world; but, gazing out of the car window, these facts at first leave one cold.

The desert hides its best. Far back in the opal-tinted hills are green valleys and golden mines. The stranger sees only the numb misery of the half-naked Indians, sheltering like animals in the remains of 'dobe huts that have been ruined in the fighting of the past ten years.

The wide plains are empty of life. The herds have gone to feed the revolutions.

Cabeza de Vaca was the first Spaniard to find gold in Sonora, on his trip to the Florida Everglades in the early sixteenth century. It is not the fact that he found gold that interests the traveler, but that he was able to march at all through these inhospitable wilds.

The mere thought of the journey is frightening. The Spaniards did not know the trail; they were encompassed about by the most dangerous Indians in Mexico—for the Yaqui, cousin of the Apache, made this his home; and they were burdened by heavy armor in an arid and savage land.

The longer one travels through Mexico the higher mounts one's admiration for these grim old adventurers. No doubt they were as brutal as they have been charged with being; but it may be questioned whether their like can be found in the history of the world for sheer, stubborn, furious courage.

To-day, Sonora must present much the same aspect that it offered to the Cow's Head—the literal translation of Cabeza de Vaca—and his companions. It is hard, glittering, and superficially inhospitable; yet in the folds of the hills are hidden the finest churches in North America—churches as distinguished from cathedrals—whose altars were once plated with gold and silver and hung with jewels.

They are abandoned in great part, it is true. Many of those that are still open to worshipers are served only at intervals by priests who ride muleback over a wide circle of weeks.

It was because of these old churches that the Sonoran mines were opened three centuries ago. The friars built them in villages that at their best cannot have maintained more than a few hundred poor Indians, and sacked the treasures of the hills for the glorification of the Cross.

ENTERING THE HORNED-TOAD BELT

One establishes one's first real contact with the land at Magdalena. It is but a small, soiled, dusty Indian town clustered about an old church. It is on the edge of the desert, sun baked, specked with the varying greens of mesquite and

THE WATER PEON AT HIS WORK

Without the square oil-can invented by Americans, it sometimes seems that the domestic processes of Mexico would cease. Wherever one goes, this invaluable utensil is in use. It is by turn stove, kitchen kettle, water-jar, and universal safe for the storage of food.

EVEN THE CATTLE TAKE A MIDDAY SIESTA

War and revolution have almost destroyed the immense herds of cattle which once roamed the States of the west coast of Mexico. Ten years ago it is probable that the horned beasts were numbered literally by the million. To-day a sight such as this is rare.

BASEBALL HAS CONQUERED BULLFIGHTING IN SONORA

There are bullfights held in Sonora occasionally, for the habit of years is hard to break; but the State authorities frown upon it, and little by little the American game of baseball is taking its place. These girls of Guaymas are as enthusiastic "fans" as those of any American town.

STURDY "GOBS" OF THE MEXICAN NAVY

Somehow a sailor always looks a sailor, no matter under what flag. This detachment of Mexican "gobs" has just returned from a detail on the peninsula of Lower California. The youngster at the extreme right is but thirteen years old, but his mates declared him a good fighting man.

PROTECTIVE ARMOR AGAINST THE THORNS OF THE BUSH

At Los Mochis, in the State of Sinaloa, where there is a large and prosperous American settlement, the bush-riders make use of a saddle equipped with flaps of soft leather. These are thrown over the knees to protect the horseman from the curved thorns when he is out upon a round-up.

manzanita and cactus, rimmed about by blue-tipped, silver-laden hills.

The old-timers call this "the horned-toad belt."

One thinks the desert unpopulated. One rides for miles without seeing more than a 'dobe hut or a wandering Indian behind a burro, or perhaps a twinkling light at night.

Yet during the fiesta of St. Francis Xavier 40,000 Indians swarm into Magdalena. At night they roll in their blankets and sleep in heaps in the dust of the street. By day they pray to the Saint and eat their everlasting cakes.

It was from the vicinity of Magdalena that the golden treasure came which so aroused Spanish cupidity at the court of Montezuma. Long before Cortez came, these mines had paid a regular tribute to the Aztec rulers.

It was from them that much of the gold was taken with which the treasure-ships were laden at Acapulco for the voyage to Spain. Too much of the gold, in fact, for the Spanish crown demanded so large a proportion of the spoils that the disgusted Jesuits finally reported the mines as "lost." They were not worked again until the advent of Americans, in 1817.

From some of these mines silver was taken out literally in plates. One nugget was found which weighed 525 pounds, and the priestly chronicler reports that "it was swung on a litter of tree branches, between two mules."

EATING IS A CONTINUOUS OCCUPATION FOR TRAVELING MEXICANS

Our friends had seemed to feel that in visiting Mexico we were taking our lives in our hands with our fingers well buttered; yet the ride southward from Nogales was as unemotional as that from Washington to Baltimore.

Now and then, as the train stopped at a village hidden in the night, we peeped

UNCHANGED FROM THE DAYS OF PYRAMID-BUILDING

This ancient plowing equipment can probably trace its lineage to the first use of the ox-yoke, and it has not been changed since. The plow is but a pointed stick attached to the pole which is lashed to the yoke. Sometimes it is shod with iron. The team is directed by means of the long goad which the plowman holds. When the day's work is ended he reverses the plow, hooks it over the yoke, and strolls home at the heels of his oxen, the end of the pole dragging in the dust.

from our berth windows to see silent Indians standing alongside the cars, each with a pitiful little tray of foodstuffs for sale. Later we became accustomed to this, but at first sight it was almost shocking.

Not one seemed to have more than a handful to offer the wakeful. Some had a few onions and some a half dozen soggy tamales, and now and then an enchilada. There were trays of the delicious Mexican sugared bread and baskets of oranges and apples.

Those who rode in the day coaches bought and bought and ate at each station. There is nothing the traveling Mexican likes to do more than to eat, apparently, and he has long ago discarded the theory that meals should follow a time schedule.

His plan is very simple. He eats at each station, and the more stations there are the more he eats.

Even so, it was difficult to see how the venders can make more than a meager living, for there is but one train a day for them to meet. It is doubtful if they average a daily turnover of twenty cents.

The explanation is, of course, that their living costs them exactly nothing. They live on the corn and beans they raise in their gardens, with now and then an egg from the unfed hens or a slice of pork from the hysterically rustling pigs. It is only the surplus above the day's needs that they sell.

It was a dark morning outside our car at Guaymas. The sun had not yet risen and the sea fog was rolling in from the great Gulf of California. We hardy northerners pulled our overcoats high about our ears and stepped out to a sight which later became familiar through constant repetition, but which never lost its picturesque appeal.

Candles twinkled everywhere over tiny, white-clothed tables on which a few

dishes of food were offered for sale. Behind each table sat the Indian proprietress.

The patrons were for the most part peons, clothed in thin cotton garments, pajama fashion, sometimes with sandals, sometimes barefooted, threadbare blankets pulled up high about their ears, their faces romantically hidden beneath the brims of their immense hats.

It was our introduction to the Mexican habit of eating and sleeping out-of-doors. Somehow, the wind is tempered to these partially shorn lambs.

No matter in what part of the Republic we might be, the flames of the candles in these little open-air restaurants seemed to rise straight up, as though no vagrom breeze ever ruffled them.

The night air might be cool to us in our three-piece, all-wool suits, under our light overcoats, but the peon is impervious to discomfort. He rarely shivers. When he gets ready to go to bed, he selects the nearest wall and curls down upon the stones of the street.

In the Yaqui country we often saw groups of Indians asleep star-fashion about a fire, heads out, feet in. A light blanket serves as cloak by day and bed by night.

THE "CARGADOR" IS A HUMAN FURNITURE VAN

The *cargadores* fell upon us in the dank fog. One of the conveniences of Mexico is that one never need carry anything anywhere. When a householder moves his domestic goods he does not call for a van. He walks down to the public square, seizes a pair of *mozos,* walks them home and puts them to work.

Two men will carry a piano. One man will if the transaction is attractive. Very large pieces are hoisted on two poles, and four men dog-trot away with them, flat-footed.

We stumbled over the rutted cart track that served as a street until we came to the hotel. The cargador led us up a flight of bare stairs, through a bare corridor looking upon a bare, wind-swept, dusty patio, into huge, bare, high-ceilinged rooms.

On the coast the summers are unbearably hot, and one must have open windows and fresh air to be comfortable. Rugs and curtains and doilies and tidies and the other woven, knitted, hooked and embroidered nuisances of life are forbidden.

At first glance, such a hotel room seems barren and cold. A bed draped with mosquito netting, a chair, a racked, twisted, dusty dresser, and no more.

Then one recalls the red Brussels carpets, worn gray in spots; the dingy window curtains hanging awry, behind which bluebottles buzz; the soot-spotted, wrinkled cloth on the stained pine dresser; the lumpy chairs and the sagging bed too often found in small-town hotels north of the line, and ceases to be too censorious.

SONORA A REGION OF INCREDIBLE FERTILITY

Right in front of the hotel stretched the bay. Once this was a town of vision and prosperity. It was one of the ports from which the peninsula of Lower California was fed, and in its fertile hinterland oranges and wheat, and corn and beans, and cattle and horses grew and flourished.

Before the farms were deserted, the herds killed off, and the mines shut down because of war, this town was full of business. Then the State of Sonora produced enough wheat to feed its own people and export some to Lower California and Sinaloa.

One realizes that the promise of desolation so richly made to onlookers from the car windows is not always kept. The valleys of the Sonora rivers—the Yaqui, the Asuncion, the San Ignacio, the Mayo, the Sonora, the Moctezuma, the San Miguel, to name a few—are absurdly fat. The adjective may seem ill chosen, but I can defend it.

The unwatered land seems infertile as a concrete pavement or the bottom of a gravel pit. It is bare, dusty, brown, burned. Then the farmer sprinkles a little seed, adds a little water, stirs it with a wooden plow, and it bursts into bloom. The crops possible to Sonora's bottoms are incredible.

But Guaymas told a story of war and loot. The bay had been silting up for years and, thanks to the stagnation which followed the collapse of the Diaz régime, it continued to silt up.

LUCIA OF PUEBLA IN HER GRANDMOTHER'S MANTILLA

The lover of the picturesque must regret that the graceful and becoming mantilla is rarely seen in Mexico nowadays. Among the upper classes Paris fashions have replaced the charming head-dresses of point lace which were brought from Spain centuries ago.

A MELANCHOLY REMINDER OF THE GLORY THAT ONCE WAS MEXICO'S

The superb old monastery of El Desierto, 30 miles from the city of Mexico, was once the most famous monastic retreat in the land. The first settlement was established there during Cortez's life, and the foundation stones of the present building were laid early in the seventeenth century. It fell into disuse during the reform period inaugurated by Benito Juarez. During Carranza's troubled rule the bandit Zapata occupied it with his troops and harried the outskirts of the capital.

THE MORNING MILK DELIVERY IN CULIACAN ROSALES

The juncture of modernism and antiquity may not be apparent at once in this picture. Yet the milk cans are of a late American model, while the burro's caparisons have hardly been changed since the day the Spaniard brought donkeys and pack saddles to New Spain. The little girl curled on the burro's shoulders—for burro addicts sit their animals at various angles—rides in each morning from the ranch to serve her customers. The man drawing a cupful will make his breakfast of a draught of milk, a light, well-browned, sugar-crusted biscuit, and be content.

A TYPICAL BELL TOWER IN NEW SPAIN

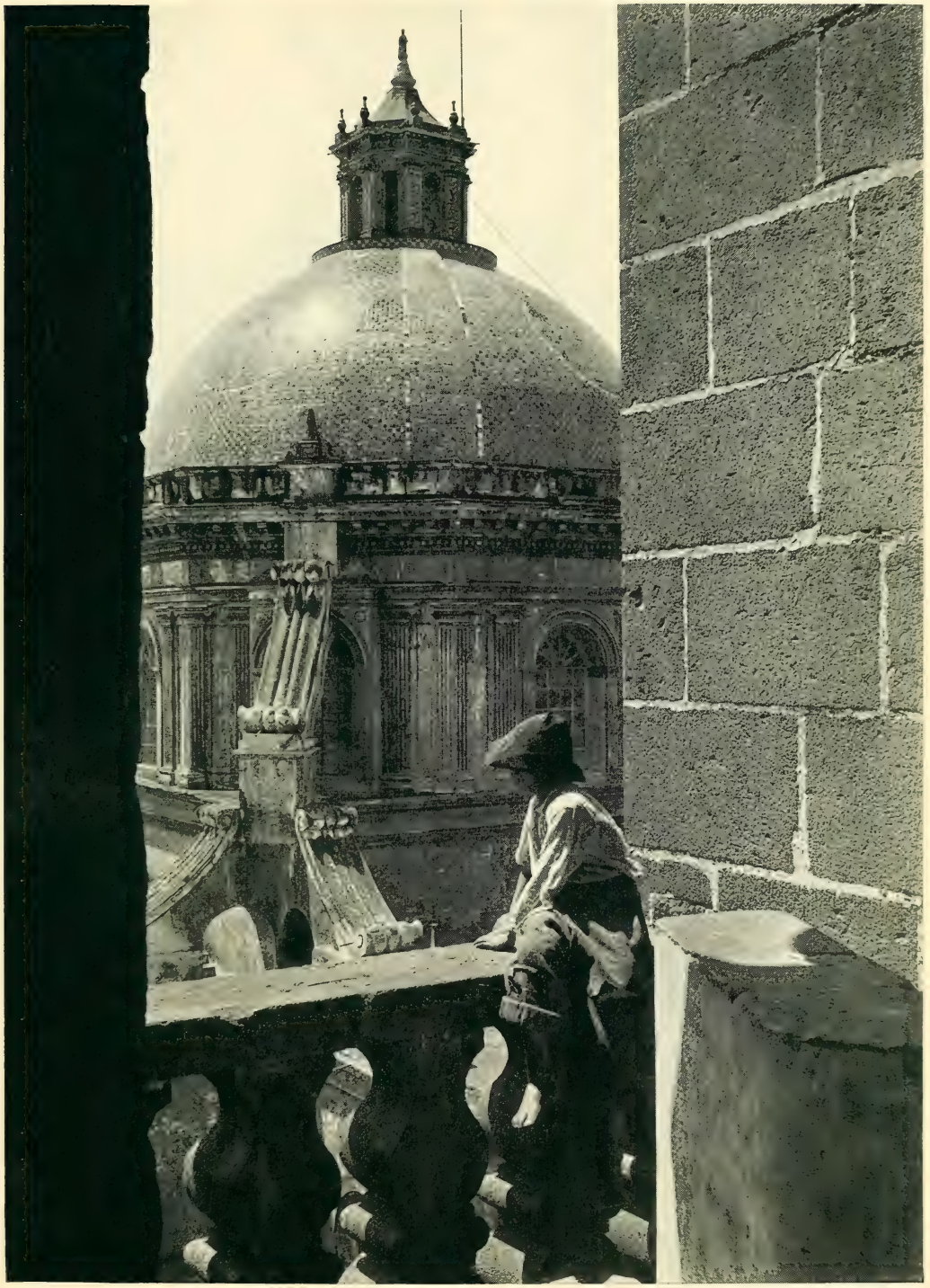
Some of these fine old bells were cast in Spain in the seventeenth century and hung in the tower of the Puebla Cathedral. They are not swung, but are struck by the clappers, to which rawhide ropes are attached, as shown in the picture. Puebla is still one of the most delightful towns in this colorful land. The Dominican fathers established here an industry in colored tile-making which has persisted in spite of wars and revolutions.

IN THE FLOATING GARDENS OF LAKE XOCHIMILCO

If graceful cotton robes were substituted for the pajama-like costume worn by the Mexican peon, and in place of the square-ended barge a great *pirogue* hollowed from a single log, this picture might serve for one familiar to Cortez's eyes. The "floating gardens" of Xochimilco no longer float, for the passing centuries have attached them firmly to the bottom of the lake. But the greater part of the vegetables offered in the markets of Mexico City still comes from this rural Venice.

FROM ONE CENTURY TO ANOTHER

The young lady of the picture is wearing a silken mantilla that was handed down to her by her grandmother's grandmother, who brought it from old Spain. She is standing on a brick-floored balcony over one of the cool, verdure-filled patios common to all the better-class houses in Mexico, the style of which was devised by Moorish architects long before Columbus crossed the sea.



IN THE CITY OF TILE-COVERED DOMES THAT GLISTEN IN THE SUN

The dome of the superb old cathedral in Puebla is covered with multicolored tiles, as are the domes of innumerable churches in that vicinity. Under the brilliant Mexican sun they sparkle with a radiance like polished steel. The interiors of most of these churches have been sacked and despoiled in Mexico's many wars, but the fine old domes remain as a proof of what existed in other days.

MODERNITY ON A MEXICAN BALCONY

To-day the Mexican señoritas dress precisely as do their sisters in New York, Paris, and Rome, due allowance being made as to the time element for a new fashion to reach remote cities so far from the center of things that one must, perhaps, travel thither on the back of a mule.

Then the World War and the internecine war came to interfere with the west coast trade, so that the gemlike little bay is now almost barren of vessels. On the farther side a German square-rigger, interned in 1914, was drying at its anchor. Here and there were smaller vessels.

A schooner from Lower California, once white, now sadly smudged, its sails torn and flapping, nudged into the little wharf. Its sailors lazily rolled ashore bales of dates—rawhide bales, sewed up in the form and size of flour barrels, as the friars had taught the Lower Californians to do two centuries ago. One discovers that these dates come from the groves planted by the friars themselves, and no better are grown in the world.

As for the rawhide in which they are baled, it is as much an article of daily use here as is barbed wire to the western farmer; or, rather, rawhide was. Nowadays there are so few cattle on the Sonora ranges that a tannery in Lower California imports its hides from the United States. Yet this tannery's leather is gold-medaled and blue-ribboned all over the world.

One hopes that this is but a temporary stagnancy in Guaymas, however. Mexican towns have the advantage—perhaps a doubtful one—of a longer perspective than our own cities, which jump from the pine shack to the skyscraper stage over night.

After all, the mines in the high Sierras still hold their hoards of gold and silver. Some time, when men work more and talk and fight a little less, the mule trains will again wind out of old Guaymas toward the rosy hills, and tall ships will again creep through the harbor gates, and Parisian buyers will again clamor for the pearls of La Paz. Then Guaymas will come back to its own.

For the moment one feels that one had best talk of the bay. Not very long, not very wide, hemmed in with hills that come down to the water's edge, the gateway invisible in their brown folds, it is one of the extraordinary beauty spots of the world.

The water has the hue and iridescence and sparkle of gems, changing and shifting and glittering anew as the light descends in varying reflections from the summits overhead.

It is a paradise for fishermen. The Indian fishers are forever sailing out in their log canoes or towing them back, fish-laden, along the shores. Unkind breezes and treacherous currents are unknown. The bay seems as gentle as those who use it.

Like everything else about Mexico, that statement must be qualified. The natives of Guaymas are gentle, but not far up the coast of the Gulf of California a savage tribe is dying.

One need not mourn the Seri Indians too much. They are naked, squalid, degenerate. They live in pits in the sand or under the branches of trees that they tie together with withes. They have no culture or traditions or kindness. They are non-producers of everything save hate.

It may be that another year or so will see the last of them. There can hardly be more than 100 left now, and each winter takes an increasing toll of their scrawny, starved, shivering bodies.*

But they have never struck their colors. They are the active enemies of every sentient being in the whole world.

LOWER CALIFORNIA AND ITS GREAT PEARL PORT

Across the Gulf of California, a few days' sail on one of the schooners that from time to time drifts languidly over these tranquil waters, is the wonderland of Baja California—Lower California.

It may be a bit arid. In point of fact, it is more than a bit arid. Horned toads carry canteens when they travel there. There are sections of the peninsula where it has not rained for seven years.

One must be a desert-lover thoroughly to appreciate the sandy wastes, its weary miles of mesquite and cactus, its huge canyons marked here and there by the traces of a race that is not only lost to history, but the existence of which cannot be explained by any of the common-sense theories of to-day.

But, provided the visitor does not fear

* See an account of the Seri Indians in "A Mexican Land of Canaan," by Frederick Simpich, in THE GEOGRAPHIC for October, 1919.

FEATHERED WARRIORS READY FOR BATTLE

Cock-fighting is not as popular in Mexico as in some of the other Latin American countries, but it is by no means frowned upon. In some of the west-coast towns hardly a game bird will be seen, while in others lines of fighting cocks are staked out by the leg under the shade of every available tree.

INDIAN CHILDREN AND THEIR PETS

Strangers in Mexico find it hard to reconcile the peon's indifference to the suffering of animals, manifested by his enjoyment of the savage bullfight, with the fact that he is invariably upon the best possible terms with his domestic animals. He may not feed his dogs, but he continually pets them.

AL FRESCO DOMESTICITY IN MEXICO

In a land where the climate rarely goes to extremes of heat or cold, where no cutting winds blow, and where a thatched roof is protection even against the winter's rains, an elaborate domestic establishment is not required.

the sands, Lower California has much to offer. Pearls, for one thing. The hidden port of La Paz is, perhaps, the third most important pearling port in the world to-day; it is certainly no worse than fourth; and yet not one man in a thousand who knows of the pearling operations in the South Seas and in the waters of Borneo has ever heard the name of La Paz.

Two years ago La Paz had more dollars per wagon-load of population, perhaps, than any other town in the western half of the world. The price of pearls had been boosted sky-high by the demand from the newly enriched of the World War, and La Paz had pearls to sell.

It had been a pearling center for centuries. When the Spaniards, led by those extraordinary noses that could smell marketable commodities over leagues of sand or tumbled mountains, first came to Baja California, naked Indians were living in brush shelters on the shores of the gulf.

They found nothing to tempt them. They were about to sail away, according to the legend, when they discovered that these naked Indians—so miraculously poor from the Spanish point of view that even their souls seemed hardly worth saving—were possessed of pearls worth the ransoms of many kings.

A PRICELESS BLACK PEARL WAS INDIAN BABY'S PLAYTHING

In the crown jewels of the emperor of the dissolved Austria-Hungary there was—and no doubt the pearl specialists know where it is to-day—a great black pearl. That gem was found in the careless hands of an Indian baby playing on the beach at La Paz.

In time the pearl-oyster beds were partially exhausted in the vicinity of La Paz, for the Mexican Government has never compelled their proper conservation, and the pearlers were forced to go farther afield.

Nowadays the pearlers cruise, when they cruise at all, on the Pacific coast as far south as Manzanillo; but La Paz remains the center of the industry.

The mother-ships fit out there, and it is there that the pearls are brought to be sold to the experts, who at the proper season gather in the little mud-walled, palm-shaded, dusty village. Two years ago the tiny hotels were so jammed with pearl-buyers from the world capitals that some of these millioned men slept on blankets in the dirty corridors.

Most of the jewels go to the Rue de la Paix or to German or Dutch buyers. But in the last season hardly a buyer was seen at La Paz. The bottom had fallen out of the market.

HOW THE PEARL OYSTERS ARE GATHERED AND DIVIDED

The mother-ships are small schooners which carry three or four canoes, each with its crew of three or four men, who work on shares. The canoe crew gets one-tenth of its day's catch, paid over oyster by oyster on the schooner's deck, and opened as fast as counted. All expenses are paid by the capitalist who outfits the mother-ship.

It is a prodigious gamble for all hands. An almost naked Indian may work all season for barely enough to pay his *frijole* and *tortilla* overhead during the winter. Or the first oyster he opens may make him rich for life.

The pearls of the Orient are mostly white and pink, which are precisely those which can best be imitated by the wily pearl counterfeiter.

But the waters south of La Paz produce many black pearls, and brown pearls, and golden and gray pearls, and pearls of many another enticing tint. They do not run as true in form as those of Borneo, but their colors cannot be surpassed.

During the boom times La Paz's streets ran with money. There is a story of a black pearl for which an Indian canoe crew—not one of whom, perhaps, had ever possessed more than a suit of white cotton and a wide hat—was paid $200,000.

To-day it is doubtful if pearls command, at the source, one-fifth the price they did at the height of the boom. But one day the world trade will revive. It always has. Then La Paz will come back into its own, as the third—or, perhaps, fourth—pearling port of the world.

TRAVELERS CARRY THEIR FUNDS IN GOLD

We began to be annoyed by the fiscal system of Mexico. It had seemed romantic at Nogales—a long step back to-

SEÑOR ZOPILOTE IN A MOMENT OF RELAXATION

Modern physicians do not agree with the Mexican belief that the buzzard is a safe and efficient scavenger. Instead, it is maintained that he is a dangerous carrier of disease. In Mexico, however, sanitation is entrusted in the smaller towns to the joint efforts of the buzzards, the pigs, and the dogs (see page 485).

ward the friars and Cabeza de Vaca—to find that we must supply ourselves with gold for the journey down the west coast.

Thanks to the geyser of paper money that burst into Mexico under the revolutionists, beginning with Carranza and enthusiastically furthered by every revolutionary general who could commandeer a printing-press, there is no governmental credit whatever. Paper money is not accepted at any price for anything.

No one will ever know how many millions of paper pesos were emitted by the various officials who had rights over printing-presses. There is even a story of a local merchant who bought a mail-order press and printed his own issue on soap wrappers.

But this is no place in which to review Mexico's financial history of the past decade. The immediate pinch was that we looked lopsided, like badly packed mules, because of the hunks of gold that thrust out the pockets of our thin clothes.

It is necessary to carry sufficient gold, because banks have almost ceased to exist in Mexico. Carranza wrecked the banking system. Now and then a merchant will cash a bank draft or a traveler's check on the United States, and then that draft or check goes floating about through Mexico, like a paper Flying Dutchman, until it is worn to tatters.

I have seen checks to which long kite-tails of paper had been pasted to hold the added endorsements.

AMERICAN GREENBACKS HAVE NO PRESTIGE IN MEXICO

We had a theory that we could carry our own greenbacks and escape the back-breaking burden of gold; but that theory had been held by many people before us, and the Mexican Government had taken steps to defeat it.

American gold is accepted at par in Mexico, but American paper money is specifically ruled against. One may not buy railroad tickets or pay hotel bills or hire mules or get food with it.

Hardly a day passes that a resident American does not try to buy Mexican gold of the newcomer with good American dollars. At first the newcomer is generous and accommodating. Eventually he changes.

Because there are few banks and few bank checks in Mexico, business is conducted either upon a spot cash or a long-credit basis. If you have no credit, you pay cash. If your credit is very good indeed, the day of payment is deferred at an estate-eating interest.

The ordinary across-the-counter transactions are cared for at weekly settling days. Each business house has a posted sign stating that bills due will be paid on such and such a day of the week. The merchants send their runners around to each other, clearing-house fashion, to receive and pay out gold.

It is little wonder that banditry has been a fairly successful business in a country in which each cellar is a suspected bank vault.

TWO SOLDIERS OF THE WARLIKE YAQUI TRIBE

For the first time in history since the Spaniards reached New Spain, the Yaqui may be said to be in a position of ease and comfort. The Mexican Government is rationing and paying the Yaqui men, partly to make certain that they will continue to be peaceful and partly to retain their services in the event of war. Every Yaqui is a fighting man.

Guaymas is on the edge of the Yaqui country. We had been conscious of the Yaqui all the way south, of course, for in Sonora he forms the background to every conversation; but it was here that he stepped into the foreground.

When things go wrong in Yaquiland he is apt to beleaguer Guaymas. It is not so very long ago that no one dared walk out of the dangerous end of town. The Yaquis have burned railroad bridges and held up railroad trains and murdered passengers.

ONLY 5,000 YAQUIS SURVIVE

At one time the Yaquis may have numbered 30,000 souls; now there may be 5,000 in all.

Their home was in the fertile valleys of the Yaqui and Mayo rivers, with the hills behind as hunting grounds. They were as tireless on the trail as the Apaches or the Navajos, and, despite three hundred years of contact with a more or less diluted civilization, are today about what they were when the first Spaniard came to Sonora.

They live in shacks made of brush, prefer the meat of burros to beef, and preserve jealously the purity of the Yaqui blood. They are religious after their own fashion, mingling the rites of the Catholic Church with those of their own barbaric faith.

Most Americans who know the Yaqui say that if he had been let alone he would have let the white men alone.

But he owned fertile valleys and mine-rich mountains. The history of our own West teems with analogous cases. The miners and the farmers established themselves in his territory, and the Yaqui declared war. The technical honors seem to have gone to the Yaqui.

It is true that at one time mines were opened everywhere in his mountains and the fat river bottoms were taken from

IN A WEST-COAST INDIAN KITCHEN

In the favored climate of the west coast the Indian does not bother greatly with domestic cares. No chimney is needed, for will not the smoke curl out of the door and find its way through the intricacies of the wattled walls? A fireplace of stone or adobe, a cooking pot or two, and the establishment is complete. This kitchen is almost luxuriously equipped, for there is a chair in the background, a mill to grind coffee, a real table, and an American lantern.

UNCHANGED BY THE PASSING OF FOUR CENTURIES

Throughout Mexico the threshing of the wheat by natives is done in this way, just as it is done in Spain and Arabia to-day. The wheat stalks are scattered upon the stones of the threshing-floor, and then mules are driven upon it. Sometimes they drag a heavy weight, which constitutes the most modern improvement known to the majority of threshing crews in Mexico. After some hours the straw is raked away, the wheat swept into piles, and then a peon winnows it in the manner shown in the picture. The wind blows away the lighter chaff.

NO MEAL IN MEXICO IS COMPLETE WITHOUT TORTILLAS

Woman's work is literally never done in Mexico, for the labor of preparing the universal tortilla is everlasting. At the right, the mother is grinding the paste from corn which has been boiled first in limewater and then again to take out most of the taste of lime. At the left, the eldest daughter is baking the thin, pasty cakes upon a plate of sheet-iron which covers one of the fireplaces in the open-air kitchen.

UP-TO-DATE WATERWORKS IN SAN BLAS, SINALOA

The burro waterworks are common to all west-coast towns, of course, but in San Blas, Sinaloa, a variation has been introduced. Here the water-bags across the donkey's back have been equipped with a cow's-horn faucet, and the precious fluid is drawn in this way. The water-sellers often travel miles to find a clear stream, and then peddle their goods from door to door.

AN AGE-OLD SWEETMEAT OF MEXICO

The workman in the foreground is pouring the syrup of sugar-cane from a ladle of ebony wood into the wooden molds. In this way panocha, the most universal sweetmeat of Mexico, is prepared. It tastes and looks much like our maple sugar, and extraordinary virtues are attributed to it by the Indians.

him; but the troops sent against him were cut up time after time.

After a battle the Yaquis disappeared without leaving a sign. The "bronco" Yaqui became the tame Yaqui overnight. He traded breech clout for the blue overalls of honest labor.

Of course, that sort of thing could not be endured by the Mexican Government. Without discussing the rights and wrongs, the fact remained that the Yaqui stood in the path of progress. President Diaz at first tried to conciliate and then to defeat them, and finally resorted to a policy of extermination.

A Yaqui scalp had a cash value over the counter. I have talked with a man who sat at breakfast with a Mexican general to whom was reported the capture of 200 Yaqui braves. Without leaving the table, he ordered that half be shot and the other half deported to Yucatan, where laborers were needed on the sisal plantations.

One hears in Sonora that not all the ships that sailed for Yucatan voyaged farther than the first shark fishing ground.

THE YAQUIS ARE MEXICO'S BEST FIGHTING MEN

Diaz had cowed the Yaquis if he had not completely subjugated them. The river valleys were given over to the plow and the prospectors roamed at will through the mountains.

Then Francisco Madero, practical idealist, enlisted them in his fight against Diaz, and the Yaquis discovered that they could play a part in politics. They are Mexico's best fighting men. To-day the tribe is being maintained with pay and rations as a part of the Mexican army.

The railroad line to Tonichi and other short lines leading into the Yaqui country have been abandoned. The Yaquis have been pursuing a policy of more or less peaceful penetration into what was once their own country.

CHARCOAL-BURNERS COMING INTO CULIACAN FROM THE MOUNTAINS

One of the constant industries throughout Mexico is the burning of charcoal for use in the tiny braziers so well adapted to the needs of the housewife in a semi-tropical climate.

"We are coming home. Get out," the Yaquis have said to many a Mexican whose family had lived on a Yaqui valley ranch for generations. Usually the Mexican gets.

If he does, the Yaquis give him orders upon the Central Government at Mexico City for the full value of the property, for the Yaquis, according to their lights, are honest and fair.

If he does not leave—he always leaves.

Recently the Mexican inhabitants have abandoned the post-office towns of Potam, Vicam, and Torin. Not a person not of Yaqui blood now lives in them. A fourth town, Bacum, is being slowly reclaimed.

The Yaquis are riding nearer the superb rice farms of Cajeme, operated by Americans through sheer grit and stubbornness, during years when the Mexican Government could not protect them, and their own government would not. The American settlements at Esperanza, where one of the greatest modern irrigation works in Mexico is in operation, are likewise being visited. Not threatened; just visited.

SILVER BULLION LEFT UNGUARDED IN THE STREETS OF SAN BLAS

In San Blas, Sinaloa, a hand-organ began to purvey mournful sounds, and a dry-river prospector and I drifted after it. He really liked the music. He had been up in the hills so long, where the music is that of dawn and dynamite, and the morning stars singing together and evening burros braying, that it sounded like grand opera to him.

Back in California he has a large house filled with servants and guests in morning, afternoon, and evening clothes.

The street sights drew me. A very handsome woman sat in the dust, her back against the wall, a little knee-high stand in front of her. She sold oranges at three for a cent, or some such trivial price. One of her eyes had been blacked, her feet were bare, and a rounded shoulder showed through the rents in her gown.

AN UP-TO-DATE LAUNDRY IN CULIACAN

Hard work takes the place of soap in Mexican laundry operations. The women take the soiled linen to the river bank and beat it upon the rocks until it is clean. The process is rather hard on the texture of the finer garments, but an extraordinary glistening whiteness is obtained.

Burros swung around the corner, engrossed in thought, as burros always are. Each dragged a pair of small logs lashed to the pack-saddle.

The keepers of the little eating stands at the station began to get ready for the day's one train. Each had a tin which had once contained five gallons of gasoline and out of which a tiny stove had been constructed. Two or three young Americans, grave, dusty, high-booted, revolvered, marched down the street — young engineers, two years out of college.

Three-inch Bain wagons jolted past in incredible noise and dust. They were drawn by oddly harnessed teams, four mules abreast on the pole and from six to ten as lead and swing teams.

The white-hot sun burned deliciously upon our backs. It devoured the filth in the streets, so that the only perceptible odor was of the fragrant oranges at the pretty woman's stand, or the occasional acrid reek of a cigarette.

A peon came out of a store with a bar of dirty white metal on his shoulder. He dumped it on a rough mat in the bottom of a wagon and wandered up the street. At intervals he reappeared with other bars, as we sat in the sun and talked of San Francisco and Washington and Paris. Then he went to a restaurant for his noon meal of beans and cakes.

The bars were of silver. They would have been quite as safe if they had been gold, for there are conventions in crime. One does not steal bullion in the street nowadays.

Bandits there are, of course.

"Were," corrected the dry-river prospector. "Were."

HOW A FORMER STEVEDORE PUT AN END TO BANDITRY

General Flores had put an end to banditry, it seemed. An extraordinary man. Ten years ago a stevedore at Mazatlan, unable to read and write. A power among his fellows because of his qualities of leadership and also because he was absolutely fair.

He had fought his way up, by sheer military ability, coupled with ruthlessness, until now he is the military governor of the three States of Sonora, Sinaloa, and Nayarit. The State authorities in Sonora do not get on with him, and so he confines his operations to the other States.

One heard of him everywhere. Always people said of Flores, "He is fair; absolutely fair."

He had stopped banditism in a way of his own. In the United States we chase bandits when they break into a bank or hold up a train. It makes excellent melodrama and often we catch the bandits.

Flores sent out *cuidadors,* which term might be translated as "care-takers," who are really one-man field courts-martial. They pop into a village in the early morning, accompanied by soldiers, who shoot at people who try to leave town through bypaths.

They set up court in the plaza and send out their agents. "Get Juan," they say, "Juan Esmeet."

The evidence has already been collected

DYEWOOD CARTS FORDING THE RIVER AT CULIACAN

The dyewood industry is a persistent one, although the unsettled condition of the past few years has held it in check. In the distance may be seen the twin towers of the cathedral of Culiacan.

and passed on—the secret-service agents of Flores have attended to that.

Juan is as good as dead when the soldiers put their hands on him. He makes a few farewells, parcels out his fighting cocks among his friends, kisses his wife and babies, and walks to the wall. They always die bravely, said the dry-river prospector.

In one village Flores had shot seventeen bandits and in another thirty-two.

One might ride through Sinaloa or Nayarit with gold pieces hung all over him nowadays. Banditry had practically disappeared. Up in one corner of Durango they still steal and kill, but that is outside of Flores's jurisdiction.

"But the cuidadors?" I asked. "Are they always honest and fair?"

"They had better be," said Dry River, grimly, "with Flores!"

One thinks of Kipling in the Fuerte River country. Perhaps the resemblances are only superficial, but they are at least striking.

The club at Los Mochis, which is a part of the Kipling analogy, is maintained for the employees of a great American ranch. Elsewhere in this delightful, but somewhat backward, land one may be compelled to subsist on frijoles and tortillas.

A tortilla is a thin flapjack, made of the paste of corn which has been boiled first in limewater and then in a rinsing water, and which has then been hammered and rolled out on the *metate*, the grinding-stone, which has not been altered in the knowledge of history.

Toasted tortillas are delicious, but the casual roadside tortilla has been merely dried to a sogginess on a tin plate, or on a stone propped in front of the fire. It tastes unpleasantly of lime.

The beans, of course, are always good; but one cannot live by beans alone. Pork can be had if desired, but after having watched the Mexican pig in his daily pursuits, I set my face against pork in Mexico. He is the companion and competitor

"HE WHO SLEEPS, EATS" IS A SPANISH PROVERB

Many a man, in these latter days of unrest, has staved off the claims of appetite by sleeping on a park bench, warmed through by the generous sun.

AN EVENING MEAL IN AN INDIAN HOME

THE BEAUTIFUL PANORAMA OF MAZATLAN

This view, taken from a hill at the western end of the city of Mazatlan, gives a very good idea of the beauties of its harbor and of the protection which light-draft vessels may find there from any wind. Port improvements which will make this one of the fine harbors of the west coast are now contemplated (see page 496).

of the buzzard. Not only will he eat everything that the zopilotes will, and these indecent birds are official scavengers everywhere, but he usually beats the zopilotes to whatever there may be in the village.

The absolute chumminess of the Mexican pig, dog, and buzzard is dismaying. I do not wish even to argue the matter of pork.

WANTED—A KIPLING FOR MEXICO

Americans do not keep happy on beans and tortillas, and so the ranch management instituted the club. The married Americans live in rose-covered paradises at the farther end of vistas of palms. In this country flowers seem to grow all the year around.

The Americans dress for dinner, and meet twice a week for dancing and bridge, now and then spending a week-end on a house-boat.

Add the swarming natives in their thin cotton, paddling about barefooted, and ox-carts, donkeys, fine horses, and—if one is interested—alligators in the lagoons, bears in the mountains, and a bad cat the natives call a tiger. All the country needs is a Kipling.

All along the coast we had heard of the ranches at Los Mochis. There are rice ranches at Cajeme, in the edge of the Yaqui country, and banana ranches at San Blas, Nayarit, three hundred miles below, where Cortez once built ships with which to cruise the Pacific, and other ranches at every step between. But those at Los Mochis are the show-places. There are thousands of acres of sugar-cane and tomatoes and beans and alfalfa.

The fences hereabouts are often made of the organ cactus. Riders through the bush use saddles made with a sort of bifurcated apron, which they throw over their knees for protection from the thorns and open out for coolness where no thorns are (see illustration, page 458).

THE TRUE STAFF OF LIFE IN MEXICO

Wherever one goes in Mexico tortillas are stacked up awaiting purchasers, or are being eaten, or are in the course of preparation. A few centavos will buy a handful of these cakes of half-raw, lime-tasting dough. The appetite for them is distinctly an acquired one, but, once acquired, it stays on. There are few things more delicious than a tortilla that has been twice roasted, so that it breaks crisply in the fingers.

Trains do not hurry away from the stations in this country. The engineer whistles; then he whistles again. The sleepers who have been dozing alongside the track, in the shade of the cars, reluctantly rise. The roadside saleswomen put away their offerings of tomatoes, onions, coffee, cakes, and bread.

The sucking of oranges begins again in the cars, along with gossip and cigarettes. Every one is friendly and happy. Sometimes the train halts for a group of frenzied riders to catch it through a mounting cloud of dust. The officers, in puttees and Sam Brown belts and revolvers, buy innumerable bottles of beer at a peso a bottle and gurgle it from the bottle mouth. Dust sweeps in through the open window.

The man in the seat ahead carried a fish to the drinking-water tank and cleaned it. Then he wrapped it in wet grass and hung it to the coat-rack, so that it dripped upon his shoulder.

Intimate domesticities are observed here and there. The woman in the seat behind obeyed at last the squalled remonstrances of a very hungry baby.

From the ancient first-class car, in which one rode upon once-plush seats, I could see through the open doors into the third-class car ahead. The Indians sat on backless benches, worn smooth and beautifully colored by age and friction, and leaned forward, their beady eyes fixed unwinkingly on the gentlefolk in the first-class car.

A sixteen-year-old girl changed her blouse and did up her hair. No one gave her a second glance or thought.

At the wayside stations small naked babies pattered about. They were the most delightful little rascals, brown and fat and gay.

The zopilotes abound. They became an obsession of Adams. He was forever stalking these obscene birds; so that his collection of buzzard pictures is, perhaps, the finest in Christendom (see page 474).

Hereabouts the Mayo Indians are the preferred laborers. They may or may not be the remnant of the ancient Maya tribe, which built such superb monuments in Guatemala and Yucatan.

It seems unlikely. The Maya civilization was of a rather high order, while these squarely-built, strong, five-foot chaps seem stupid. They prefer not to live in houses, and many a time a ranchman has established a new family in a good hut, to find them next morning crouched under a ragged blanket stretched upon a bush.

The port of Los Mochis is Topolobampo. Once it had hopes. That was when Americans planned to build a railroad across the mountains from Kansas City. A pier was constructed, the rotting remains of which are still used when an occasional boat drifts into the little bay. A stub-end of railroad was built up the Fuerte River. It should have met the line which was being built through the mountains, south from the border, but by and by building stopped in the hills.

All around Topolobampo is the weird, mysterious bush, through which one-mule-wide trails go winding. One wonders what is at the other end of the trails—what can be at the other end.

An occasional cow, bursting with fatness, crops her way through the jungle. Deer gaze mildly from the edge of the narrow clearing through which the railroad runs. We hear of huge snakes—

We refuse to listen to snake stories.

SHRIMP SWEPT BY TIDE INTO MOSQUITO-INFESTED TRAPS

The Indian meaning of Topolobampo is Tiger Water, so called because the declining rays of the sun, falling upon waters that swarm with golden shrimp, give the effect of a tiger's skin mottled in purple and gilt and gray.

Carloads of shrimp are sent from here during the season to the United States. They are caught in traps by heroic Indians as the tide sweeps them on. The Indians are heroic, because no one else can resist the masses of mosquitoes that fight their way through the smoke of the smudge that is tied alongside the trap. The Indians work desperately with long poles "to poke the big fish off," as one shrimper explained.

Our entrance to Culiacan still pleases me in retrospect; it was so unreal and stagy. We tumbled down an embankment that was fitfully lighted by tallow candles, the beams from the headlight, and the lanterns of the trainmen. A

cargador, buried under our mountainous bags, scampered ahead for a cab. The morning was crisply cold, the stars unbelievably near and vehemently bright against a background of fathomless, cloudless, dark blue.

We climbed under the half roof of a low-swung carriage, behind a driver who towered above us in buckskin and brass buttons and a cathedral-like black hat. The little horses reared and jumped and fought for their heads. Their neat round hoofs pattered on dark streets cobbled in quaint patterns between dark, one-story houses.

The driver hammered at the double door of the dark hotel. Through a half door, set in one side of the great portal, two odd figures scuttled out.

They were the night porters, who sleep by night, Mexican fashion, in the great arch of the door. Bemused by sleep and cold, they said no word, but led us to our beds.

I sank into sleep, barely conscious of the vine-tangled patio outside, of the fifteen-foot ceiling overhead, and of the stones of the floor, worn into hollows by passing generations.

MORNING MADE HIDEOUS BY CLANGING BELLS

A most abominable clangor woke me to curse a hotel which would permit such a breakfast gong.

It was not a breakfast gong after all. The vicious tumult came from the church bells of Culiacan. As we traveled on, we became accustomed, in time, to the incredible uproar of the Mexican church bells; but none ever approached in horror those of Culiacan. They remain my most vivid memory of this fine old town.

Yet there is another sound that marches in my memory with the bells. Each morning as I cursed the sonorous bombardment I would hear another sound under the window that gave upon the street—slip, slip, slip—the faint shuffle of barefooted Indians on their early way to work—marketmen and women, probably; no others would rise at such an indecent hour. I could barely see them, sliding through the gray of dawn, indistinct in their white cottons and straw hats; but for the almost inaudible susurrus of their sandaled feet, they might have been sheeted ghosts.

Through the open doorway came the light rustling of the palm branches in the patio, stirred by that breath of air that heralds the sun.

It was a relief to find the cathedral was not worthy of its superb exterior coloring. One grows tired of altarpieces and the blackened paintings of saints.

Outside we watched the policemen, wide-hatted, sword and revolver in belt, riding snappy little horses.

Ice is properly regarded in Culiacan as a luxury and is treated ceremonially. The ice wagon was painted white and gold, like an animal van in a circus, and was drawn by two white, pink-eyed mules.

Long teams of mules hauled in dyewood.

RAILROAD TIES OF EBONY AND MAHOGANY

From Culiacan to Altata, a dying port, there is an ancient British built railway, of which the ties are ebony. This is no longer startling, however, for the Southern Pacific's tie contract provides for forty-two kinds of wood, of which mahogany is a commonplace.

Housemaids on the ranches are paid one peso weekly, which is equal to fifty cents American. Drivers of excellent two-horse teams wait for the four-o'clock-in-the-morning train, on the chance of a two-peso fare.

In front of the movie theater women sit each night behind tables covered with crude sweetmeats, under twinkling candles. Three dollars American would buy the entire stock.

Culiacan is the capital of the State of Sinaloa. A prosperous town once, it was ruined by the war, as were the other coastal towns. In the handsome market-house only the cheaper necessities are sold. The banking-houses are for the most part empty. Commercial travelers still visit the town with that complaining industry common to the breed.

Even in the most crowded hours the streets seemed almost empty. But this can only be a state of suspended animation. Anything can be raised in the fat soil under the almost hothouse-like conditions.

THE "HOUSE CAT" OF A HOTEL IN MAZATLAN (SEE PAGE 496)

In Mexico one takes certain things for granted. Boa-constrictors are far better mousers than are cats, even if the boas did not invariably eat the cats when the two are in competition. Therefore one obtains a boa for a mouser, if one is in a boa-constrictor country, and thinks no more about it. They are docile and harmless, but do not enjoy being handled, even if they do not resent it.

THE FAMOUS FLAT ARCHES IN OLD SAN BLAS

A flat arch is an architectural rarity nowadays, but the sturdy churchmen who built this superb old edifice at Old San Blas, in the State of Nayarit, where the galleons once landed stores of silk from the Philippines bound for the court of Spain, had the secret of their construction. Now the church is in ruins, and certain citizens of the world underfoot writhe through the openings in the walls torn by the encroaching jungle.

In the mountains are mines, of which some produced steadily since Spanish times, until their owners were compelled to shut down by reason of the war, and of the experiments in taxation which followed.

ROAD OF AZTEC CONQUERORS RUNS PAST CULIACAN

The old road down which the Aztecs marched on their way to the conquest of Mexico runs past Culiacan. On the rock walls of the canyons their carvings may be found.

Unless rumor does them wrong, the Indians here still worship the old gods, though they have confused them somewhat with the gentler teachings of Christianity. It was but the other day that workmen on the great irrigation project the government is furthering near by found a painted jar or unbaked clay, ten feet high and eight feet across the mouth, filled with little painted clay images.

Gods, perhaps, or toys; no one knows, for the workmen destroyed jar and figurines alike. Not far from Culiacan is what is said to be the largest meteorite in the world.

Twenty miles from Culiacan, over a road compact of dust and bumps, we found an old panocha mill. It had a steam-engine and a cane-crushing device, but otherwise the panocha was made just as the Aztecs made it, no one knows how many centuries ago.

The juice of the cane was boiled down and sugared off in troughs hollowed out of ebony, and sold in crude cakes that are in every market-place in the Republic. Panocha looks and tastes much like our maple sugar, and the Indians attribute the most extraordinary virtues to it.

THE MYSTERY OF THE LOST CITY OF BACIS

One has but to open one's ears to hear the most entrancing stories. Little mining villages in the near-by mountains are provisioned by mule train from Culiacan. Through Indian villages pass the trails that are as they were in Montezuma's time, and have been used so long that the unshod hoofs have worn holes eighteen inches deep in the enduring rock.

In these hills—somewhere—is the Lost City of Bacis. One wanders by mule for days and miles until he comes to the village of Bacis; then one goes no farther. The mountains have become impassable. The little river which brawls down the canyon is boxed in precipitous walls.

Prospectors have tried to fight their way farther and have returned baffled; and when a prospector quits no other man born of woman need try the traverse. Even the Indians declare they do not know the higher reaches of the hills.

Yet—so say those who repeat tradition—oranges sometimes float down the little river, and bits of oddly woven cloth that have caught on twigs, and carven wood. A legend has grown that somewhere in the hills is the Lost City of Bacis. There are men and women living there, say those who believe, and their houses are filled with gold, and there are fragrant orchards on the open slopes.

It is said that the Indians have guarded the Lost City since time immemorial. Not even the Spaniards reached it. It is still as it was in Montezuma's days.

One feels grateful to those who tell such tales. They are pleasant to hear.

A PICTURE OF THE DEPTHS OF MEXICAN POVERTY

At Culiacan a veil seemed taken from my eyes. I had been blinded by the color and movement, the strange and picturesque life, the romantic accessories of Mexico.

I now began to realize the depths of poverty in which most of the lower-class Mexicans live. They do not often starve, perhaps, for they have that charity that distinguishes the very poor; but they rarely have enough to eat. They lack all luxuries except tequila and pulque and panocha and tobacco. They live on a plane of discomfort and unhappiness and ignorance.

I had been looking on the Mexican habit of taking a siesta with a certain contempt. No sun had been warm enough to keep Adams or me under shelter. We had wandered through miles of empty streets, between shuttered houses. The occasional passer-by looked on us with amusement, as two mad Gringoes who knew no better.

"They're lazy," I said.

But they are not. Well fed and well

HERE RESTING IS ALMOST A SCIENCE

In this pleasant town of Mazatlan, where the warm sun beats upon one's back and the dry sand is kept clean by a scouting wind, there are many such picturesque streets as this. Work seems not to be a matter of import; no one hurries.

clothed, the Mexican Indian is a fair laborer; but usually he is half starved and half dead for sleep.

A LIFELONG DIET OF CORN AND BEANS

From the northern border to Chiapas, the Indian—and of the 15,000,000 Mexicans more than 6,000,000 are pure-bred Indians—is on the border of complete destitution. He has so little that he has really nothing.

The unvarying food in every puebla is frijoles and tortillas—beans and cakes. The Indian may get a slice of meat now and then, when the scavenging pig or one of the few remaining cattle has been killed. There are a few chickens in each village. He may, now and then, kill a little game or catch a few fish.

But, broadly speaking, he lives on corn and beans. To mitigate the monotony of that diet, he soaks his food in chili sauce. The blazing torture that sets up in the unaccustomed mouth is almost that of a fire blister. Yet the Indian eats it by the handful.

He lives on this diet. That he has the sturdiest sort of a constitution is evidenced by the fact that an Indian, habitually underfed on corn and beans, is able to fill his *morales,* a sort of bag the runners tie to their waists, with a ground mixture of parched corn and salt and live upon it for weeks in the back country, where no other food is to be found.

But that he will do better work and more of it and more days of it to the week on better food has been abundantly proved by American employers, who insist on feeding their men.

If the peon is given money for food, he buys beans and cakes and tequila; but if he is fed in the company kitchen, he grows strong and works hard.

In the north he huddles in a 'dobe hut, usually without windows, sometimes without even window openings. The floor is mud, the only furniture a few earthen cooking pots. It even lacks a chimney, and the fire is built in the middle of the floor and the smoke curls out at the level of the rafters.

His clothes are two pieces of thin cotton, with rawhide sandals sometimes. His womenkind wear sleazy wrappers. He folds a blanket about his shoulders in the day and sleeps in it at night. Usually the man of the house and his wife and the surviving children sleep on the mud floor without a pretense of a bedstead or bedding more than an armful of grass, when the pigs and dogs and chickens have tracked in too much water during the rainy season.

FIFTEEN YEARS IS THE MEXICAN INDIAN'S AVERAGE LENGTH OF LIFE

I said the surviving children because the death rate of children under one year of age is twice what it is in the United States, and the death rate of children under ten is three times as great. The average tenure of life in Mexico is fifteen years. Mexican statistics are untrustworthy, but these given have not been challenged, to my knowledge.

It is not now strange to me that these half-clothed, half-fed, shivering folk wake up in the middle of the night to talk, nor that they must sleep in the hot sun of noon. The marvel to me is that when they wake up—of a cold midnight, when in a blanket and overcoat and warmly bedded on a pile of straw I shivered—they always laugh and chatter and seem happy.

As one goes farther south, the only difference in living conditions is that the Indian wears fewer clothes, and that his home is made of thatched poles instead of adobe.

The clay-built huts of Guaymas gave way at Culiacan to brush jacals. Three sides of the shack are walled in by poles, through the interstices of which the sun sometimes shines and the winds blow. The fourth is open to the world. Over all is a brush roof.

A little cooking place is built up on the open side. A metate, or stone on which the boiled corn is ground for tortilla paste, a few round pots in which water is carried from the river, a gasoline tin or two for cooking, and the home is complete.

"One can get almost anything for an old tin can," a roaming prospector said. "Such things are priceless to the Indian."

Pessimism is not justified, however. The Indian is what he is to-day because of centuries of oppression, misrule, and demagoguery, perhaps, but also because he is an Indian. He knows no better.

INTIMATE DETAILS OF THE KITCHEN AT LAS TRES MARÍAS

The cook at the penitentiary settlement on the islands of Las Tres Marías is here shown chopping up the meat for dinner. Because there is practically no ice to be had throughout the greater part of Mexico, the day's supply of meat is usually killed just before it is sent to the kitchen. A contented cat is purring in the foreground, while the dogs are prowling about in the hope of espying unguarded tidbits.

EVERY CONVICT IS HIS OWN COOK

A view of early Sunday morning activities in the penal settlement of Las Tres Marías Islands, off the west coast of Mexico. The convicts, who for the most part are serving time for minor offenses, are permitted to cook their own food.

Ambition has been dead in him. If he has had a little patch of ground in which to raise his corn and beans, and a pig or two running about, he has been content. To have more has in the past been a challenge to fate. A pauper might escape the attentions of bandits or patriotas, but a well-to-do Indian, living in a good house, with horses and cattle and burros, assuredly would not.

Likewise, the country has been about as thoroughly developed as is possible without the aid of foreign capital. Irrigation works on a grand scale cannot be put in except through governmental or banking aid, and capitalists have been sheering away until Mexico's disposition to play fair with the investor has been demonstrated.

MAZATLAN, THE CITY OF PARROTS

It was at Mazatlan—heavily accented on the final syllable—that we were abashed by a parrot.

There were parrots everywhere, of course, from mere flashes of color to middle-sized birds that talk, and on to huge creatures that not only squawk, but have a hideous intelligence.

Indian men and women go about the streets with them for sale in cages. It is difficult to understand who buys them, for the potential customers are poor as poor, but the parrots sell. None of the other street venders wear more contented faces than those who deal in birds.

During the rainy season at Mazatlan the streets become torpid rivulets of mud. As the pack-horses pick their slow way over the uneven cobbles, the foul liquid spurts from beneath their hoofs and splashes waist-high on the house walls.

As some measure of protection against this mud bombardment, the pavements have been elevated two feet or more above the level of the street. The gallant gives the wall to the fair or to the stranger he wishes to honor. One crosses the streets by stepping-stones.

Marching along the pavement, one meets the eyes of parrots roosting on the swinging doors of the bar-rooms that dot the main street. They make sounds like corks popping.

Our parrot was a fat, high-shouldered, depraved bird who never spoke. He watched Mazatlan pass along the pavement with a sour and cynical eye, but when he saw us he fluffed up his feathers and gave way to a fit of helpless laughter. His body shook, his mean old eyes half closed, and his senile head laid on one side, precisely as a vicious old man might indulge in cruel laughter.

At first we enjoyed it, but later we became self-conscious and angry.

Not even the ten-foot snake that served as rat-catcher in our hotel could rival the parrot's fascination, though we admired the snake for his business acumen. When he set up in business he disposed of competition by first swallowing the hotel's cats (see page 489).

In the Indian tongue, Mazatlan is the Place Where the Deer Come Down to Drink, but it might well have been called the Place of the Girls.

Nor can pretty girls have a more dainty setting. The residential district of the town is set along the half-moon of the Bay of Olas Altas, or High Waves, in which the rollers from China come to break upon the beach.

Out in the bay is set a needle of rock, just big enough to support a light, and the crescent is edged and barricaded by superb cliffs, along which a fine road has been built from the abandoned fort at one end to the shrine that tops a hill with its cross at the other (see page 485).

Culiacan had been of a dusty white, save for the azure cathedral, but here the houses are colored in blues and pinks and browns that might almost be of Bologna. These are no glaring colors, but washed and faded out to a demure background for the brilliance of the feminine display.

The sex here is cheerfully inconsistent, too. The grown-ups do not flirt, but the very little ones on their way to school withdraw very little powder puffs from little vanity bags and tone down the high lights on their little noses.

MAZATLAN A PORT OF FUTURE IMPORTANCE

This will be an important Pacific port when the works now in contemplation are completed. Then large ships can come in through the island portals that protect the entrance.

THE MYSTERIOUS MAN OF LAS TRES MARÍAS

Only one man in this west-coast penal settlement could talk English. Oddly enough, he talked very good English indeed, though one would not guess it from his somewhat disheveled appearance. But he resisted efforts to reveal his life history.

ON THE WAY TO THE MARKET

The little Indian girls are on their way to the morning market in the isthmian city of Tehuantepec. They may have carried these heavy baskets of maize upon their heads for miles and thought nothing of it, for the Indians of Tehuantepec are famed for their burden-carrying ability.

The hinterland is a rich one, and before the war, was very prosperous. Only a day's ride away is Rosario, which has been a mining camp since the Spaniards' time. The old church there is made of cut stone fitted together without mortar, and once was almost plated inside with precious metals.

Back in the hills the lucky ones may get on good terms with the Indians. They are not hostile—precisely—but neither do they welcome strangers.

THE AZTEC GAME OF HIPBALL IS STILL PLAYED

It is near here that the game of hipball is played. The Indians use a solid rubber sphere weighing more than twelve pounds. It must not be touched with the hands, but is caught upon, or thrust by, the hip. It is a dangerous and exciting game, not often seen nowadays by white men, and comes to the poor Indians of to-day in straight descent from their proud ancestors.

In Aztec days courts were built with carved stone walls, and stone rings were set against them through which the ball was to be hurled. Successful players were often enriched by the delighted spectators. Archæologists have found the remains of these great courts in many places throughout the Republic (see illustration, page 500).

The waters about Mazatlan swarm with fish. There are more than 100 species and subspecies within a radius of 60 miles, of which 40 are of commercial value and 20 are found in sufficient quantities to permit of commercial canning operations.

Of these the most interesting from the non-expert's viewpoint is the striped mullet. They are such intelligent fish that they leap over the seines set by the natives.

But fish brain is not yet the equal of man brain, and the Indians set canoes at a little distance back of the net, into which the leaping fish shower by the hundred. When the fisherman has a canoe-load he paddles home.

To uncommercial-minded travelers the sight that never palled was the parade of wild birds along the crescent shores of the bay. One morning thirty wild geese flew over so low that we could see their beady little eyes glisten. A game shot could kill, anywhere along this coast, up to the limit of his shame.

SOMEHOW, THEY ALWAYS SEEM HAPPY

There are no more lovable people than the Mexican Indians, even though we admit their faults. They are always poor, often half starved, always more or less oppressed by the upper classes, and yet they always seem to be happy.

Even his conscience would be protected, for the buzzards doze with their toes in the edge of the surf, waiting for the flotsam of the bay, and they would dispose of his kill before he had time to grow morbid over murder.

EACH STUPID PELICAN ACCOMPANIED BY A ROBBER GULL

As I stood there watching the geese, two long strings of pelicans flew parallel with the sea wall, 40 feet in the air.

"Look at the gulls!" said my companion.

Each fishing pelican seemed to have its attendant gull. When the pelican seized his fish and disposed himself on the water to swallow it, the gull hovered near. The

THE ANCIENT GAME OF HIPBALL

These huge stones, now in the Mexican National Museum, served as goals in the ancient game. The players caught the rubber ball, weighing 10 or 12 pounds, on the hip or shoulder, never using their hands. The object of the game was to shoot the ball through the hole in the center of the stone. In the superb courts used by the ancients these stones were set in the walls, and players were sometimes made rich for life by the prize of a single game. Nowadays the west-coast Indians play the same game, but with a simple home-made equipment (see text, page 499).

pelican would juggle the fish about so that it would be headed south when he opened his bill. Then he would cant his head back over his shoulders and open his bill, so that it would drop into his pouch.

Then the waiting gull would take the fish and fly away.

The pelican would sit on the water in a half-dazed condition for a time. Then he would set about the business of getting another fish. It seemed to me that most pelicans acted as though they were discontented.

Ducks are not delicacies at Mazatlan. They are merely ducks. The Indians put nets on the water during the night and reap the birds when their feet are caught. One buys one's duck alive in the market, just as one does other feathered foods.

There is no standard rating in the markets on fish. One simply gathers up what fish one wishes, puts down a few copper coins, and moves on.

MAKING THE ACQUAINTANCE OF "A GAME LITTLE CODGER"

After an arduous and adventurous trip to the convict colony on Las Tres Marías (see illustrations on pages 494, 495, and 497), in the *Sin Nombre,* a small Mexican coastwise boat, one dawn found us in the Bay of Miramar, a half-moon on the coast of Nayarit. It was a perfect tropical morning. To the left a white-pillared house gleamed against the green background of the banana bush. White-clad figures moved about it and a boat or two was being run through the well-behaved little breakers and a bell tolled.

To the right the darker tones of the foliage told of a jungle as yet untouched. Parrots screamed overhead in a gossipy flight from one horn of the crescent to the other. On the beach a great crane stood on one leg, waiting for his breakfast to come to him, and grave pelicans, their heads cocked back in absurd hauteur, flapped heavily along the green surface of the inshore water as it sparkled in the early sun.

Now and then a fish hawk of sorts dropped like a thrown knife. He cut so clean that hardly a drop was thrown in the air, although he invariably sank his tail feathers in his dive. Nor did he ever come up without a fish.

Porpoises dived and dived and dived, until one tired of watching. A whale spouted in the entrance to the bay, fish leaped diamond-bright in the air, and sharks' fins slipped by.

Overside a little Indian watched me courteously from a dugout canoe. He lifted his hat when I caught his eye, and expressed a pious wish that God would guard me. That little Indian fascinated me. He proved to be such a game little codger.

He and his two brothers were on hand to lighter off bananas, for the water is so shallow that even a piepan like the *Sin Nombre* could not go within a quarter of a mile of the shore.

The dugout was a beauty. Its sides had been fined down to the average thickness of an inch, from one massive log, and its lines could not have been bettered by a Herreshoff.

After the morning tortilla and coffee, we broiled on the engine-house roof until it appeared that banana lightering might take hours; then we went ashore.

The gem-like manor-house proved to be a German possession, and the war was far from over at Miramar; and so we pushed on to the small inland village of Santa Cruz.

Pigs were asleep in the sun. The prattle of children's voices came to us through the interstices of the pole wall of the school. A great sow, two lesser porkers, and four dogs grunted and twitched and fought fleas convulsively in the mild draft of the school doorway. There were wattled houses with high conical roofs, a few tethered fighting cocks, some Indians asleep, dust shoetop deep, and a sweltering heat that was not relieved by even the faintest breath of air, for Santa Cruz is walled about by the jungle.

So we returned to the boat.

INDIAN BOYS AS BANANA STEVEDORES

As the sun rose the small Indian boy had deleted his apparel, bit by bit, until now he worked mother naked in the sun. His job was to stand shoulder deep in the water and hold the bow of the dugout from floating out to sea while his elders put the banana bunches aboard. Now and then he varied this by toting bananas.

He always pulled a sturdy oar in the journeys to and from the *Sin Nombre,*

A "LITTLE MOTHER" AND HER LITTLER CHARGE

Dolores was somewhat shocked but rather pleased by the photographer's suggestion that he picture her at her bath.

and as long as we were in sight he kept two round, unwinking black eyes fixed on us. So might a small American boy watch his first hippopotamus.

We cruised along the coast, here and there, taking on more bananas, which were brought on pack-mules from the hidden plantations of the interior. At last night came and the *Sin Nombre* pulled up her mud-hook for the run to the old port of San Blas, Nayarit, where we were to be put on shore.

AT SAN BLAS, WHERE CORTEZ BUILT HIS SHIPS

Once Cortez built ships here to explore the Pacific coast. Later on the high galleons from the Philippines entered San Blas with silks for the court of Spain. Now even the little coastal boats must use care in entering its sand-filled channels.

The dugout was towed behind, for it was to be used in putting us on shore.

It was a black midnight when the sturdy thumping of the *Sin Nombre's* engine was stilled and we were routed out from beneath our sail on the roof of the engine-house. The dugout was pulled alongside and we crawled in.

The *capo* was asleep in the stern, his dark blanket wrapped about his head. In the bow slept the second brother, his wide hat tilted over his eyes, his blanket around his shoulders.

In the waist sat the littlest Indian, an absurd diminutive of his brothers, even to the little knife in his wide sash.

LANDED PICKABACK

The moon was overcast by black, sliding clouds. We could barely make out the ragged tops of islands against the heavy sky. Long before we could see the white foam of the breakers, we could hear their roar as they charged the sand-choked entrance to the little bay.

And then the littlest Indian came into his own. He laughed. Bless his heart, how that boy laughed and chattered! He must have been tired to exhaustion, but his voice rang bird-like. The others recovered from a midnight grumpiness and in turn began to laugh and talk. Now and then the capo interrupted by a sharp order.

Several times the canoe was checked, until at last it was beached in the soft sand on the crest of a breaking wave. I climbed aboard the capo's shoulders to ride a dry pickaback to land and, as the capo was a slender Indian, I drove my unfortunate mount into the sand like a log under a pile-driver.

The littlest Indian twittered until the capo gasped with laughter and almost spilled us both in the frothy spume.

There were millions of hot-footed gnats in that sand, and they stung us almost to madness. San Blas bears a villainous reputation for the variety and venom of its insect pests, even on the west coast.

We danced and slapped and fumed while our dandy Indians undressed themselves in the darkness that was made visible by the reflected light of the hidden moon on the glancing waters of the bay. Then they redressed in clothes of gala white, which they had brought with them from their village of Santa Cruz for the entry into the big town.

The capo brought out a silver-handled

town knife from the bag in which these sartorial creations had been kept unspotted from the waves. So they led us into town.

A DISMAL SEARCH FOR A HOTEL

"Hotel," we said.

The Indians nodded. The sand was soft and deep. Our feet found the rails of a long-abandoned tram-line and found them hard.

A dog rushed us from an ancient, pillared portico. We blinked the darkness out of our eyes as we entered a whitewashed room in which a lonely boy of eighteen sat in the radiance of a tallow candle surrounded by an insect aureole.

We thought, poor fools, that we were in the hotel, but it was the custom-house. Even at such a port as San Blas one goes through the customs. The lonely boy helped us through the formalities and we stumbled again into the dark street. A policeman's whistle shrilled the hour and an iron bell clattered.

Perhaps if Caterina had known that two Americans were outside her doors she might have opened them, for Caterina has the name of being friendly to Americans; but she did not, and we said no word. We did not even know that the dark house was a hotel when the Indians stopped in front of it. No light was visible. No light was ever visible.

The Indians tapped lightly until from the inside a feminine voice told us to go away.

"Two señores desire a night's lodging," said the Indians, gently.

"Just country people," said the feminine voice, disparagingly. "Let them sleep in the street."

The keeper of the half-darkened saloon opposite rose from the chair on which he had been strumming a soft guitar and came to our aid. He knocked furtively at the door. He called for Caterina by name, and then for Dolores and Elena. The cold voice within stated that its owner earnestly desired that we be on our way.

"There is another hotel," said the keeper of the saloon, "but it is in bad condition."

The gods forbid that I should cry fie upon a lady's hotel-keeping, but it is a fact that the saloon-keeper was right.

WHEN ONE READS ABOUT THE "REBOZA"

Native girls and women are rarely seen without the shawl-like head-covering known as the *reboza*, though its color changes in the various States.

After all, Maria was of a good sort. She made no difficulties about admitting us, but threw her door wide open. Later we discovered her to be fat, kindly, and superior to any imported eccentricities about sanitation.

A FAREWELL TO THE LITTLEST INDIAN

The capo and the second brother smiled so that their perfect teeth shone in the darkness, as they lifted their hats in farewell.

The littlest Indian, his small face hidden in his serape, his little knife thrust in the folds of his little sash, his feet that had been bare all day smarting under the straps of the new sandals for city wear, smiled at us in the cheeriest fashion as he, too, lifted his steeple-crowned sombrero and strode out, like the villain of a midget melodrama, to the sights of the sleeping town.

Photograph by A. W. Cutler

"SORRIA-SE"

The amused expressions on the faces of these Lisbon orphans may perhaps be accounted for by the camera man's pronunciation of the word "Sorria-se," which is Portuguese for "smile." At any rate, the desired effect was achieved.

LISBON, THE CITY OF THE FRIENDLY BAY

By Clifford Albion Tinker

LEGEND has it that Ulysses founded Lisbon.

It may be so. For twenty years he sailed up and down the Mediterranean, and more than once during his wanderings ventured beyond the rocky Pillars of Hercules. And, too, the Phœnicians found a black-eyed, raven-locked tribe in Lisbon when they took possession. At that remote age the ancient town was called "Olisipo."

Sun-kissed on its eleven hills, Lisbon has all the delights of a salubrious climate; stretching for five miles along the banks of the mighty Tagus, it offers the finest harbor in Europe; seven miles from the open sea, it is protected from the Atlantic's gusty storms; it is the center of a rich and ancient province, the capital of a nation and the seat of culture and learning.

Lisbon is all this and more. It is the largest and most strategically located seaport on the remunerative ocean trade lanes between London and the Mediterranean on one hand, and between London and Cape Town on the other.

Lisbon is also the central metropolitan storehouse for Portugal's outlander colonies. Into its markets pour the tributes of the vine-clad Azores; the rich wines of Madeira; the tropical delicacies of the Cape Verdes; the vilest of tobaccos from Dakar; dyes and gums from Guinea; cotton, gold, and rubber from Angola; ebony, ivory, and grains from Mozambique; tea, rugs, and ivory from Goa, in India; more tea, silks, and fabrics from Macao, in China, and choice drugs and spices from Malayan Timor.

Lisbon is far from being decadent; it has increased in population more than 40 per cent in twenty years.

A SUPERB PICTURE WHEN APPROACHED FROM THE SEA

Approaching Lisbon from the sea, one's expectations are aroused by the sight of the Serra de Cintra, off on the port hand, veiled in purplish atmospheric haze—a sentinel mountain with saw-toothed ridge, which bears a castle where its craggy crest seems to melt into the sky. Ghostly towers reach up from this castle, and, as the ship hurries on and brings the sunlight bearing on the heights, the spires take on the appearance of ivory stalagmites on an iridescent base.

Now the ship plows along by Cape Roca, and on by Cape Raso, and the heavy cloud-masses which have been chasing behind us all morning, caught in a freshening breeze, suddenly and swiftly swing in over the land, enveloping the peaks of Monge and Peninha in a bonnet of whirling scud. Not until then did one appreciate the true height of those mountains; their summits are nearly eighteen hundred feet above the sea. The bold headlands of the coast, being closer aboard, dwarf them out of scale.

A FAMOUS WATERING PLACE FOR TWO THOUSAND YEARS

Leaving Cape Raso on the port quarter and standing broad into the bay brings into view the Riviera of Portugal. This lovely coast has been a famous watering-place for more than two thousand years. Immediately after the destruction of Carthage, at the end of the Third Punic War, Roman generals and senators flocked here to enjoy the baths and winter sunlight; for with the fall of Carthage the peninsula became a Roman province.

From Cape Raso straight on to Lisbon proper, there is scarce a break in the amazing array of palaces, forts, hotels, casinos, hamlets, and beacons lining the shore and spilling over against the hillsides which slope back to the open country. Smooth, sandy, curving beaches break the rocky coast-line at intervals, and on these bathing slopes long, rolling combers spread a line of soapy foam in direct contrast to the geyser-like spray dashing against the steep and ragged bluffs.

Ivory, gray, pink, and glistening white walls, topped with scarlet and orange tile, emblazoned against a background of bronze green, with the foliage of African and semi-tropical plants skillfully arranged for vista effects, make this stretch

Photograph from John Oliver La Gorce

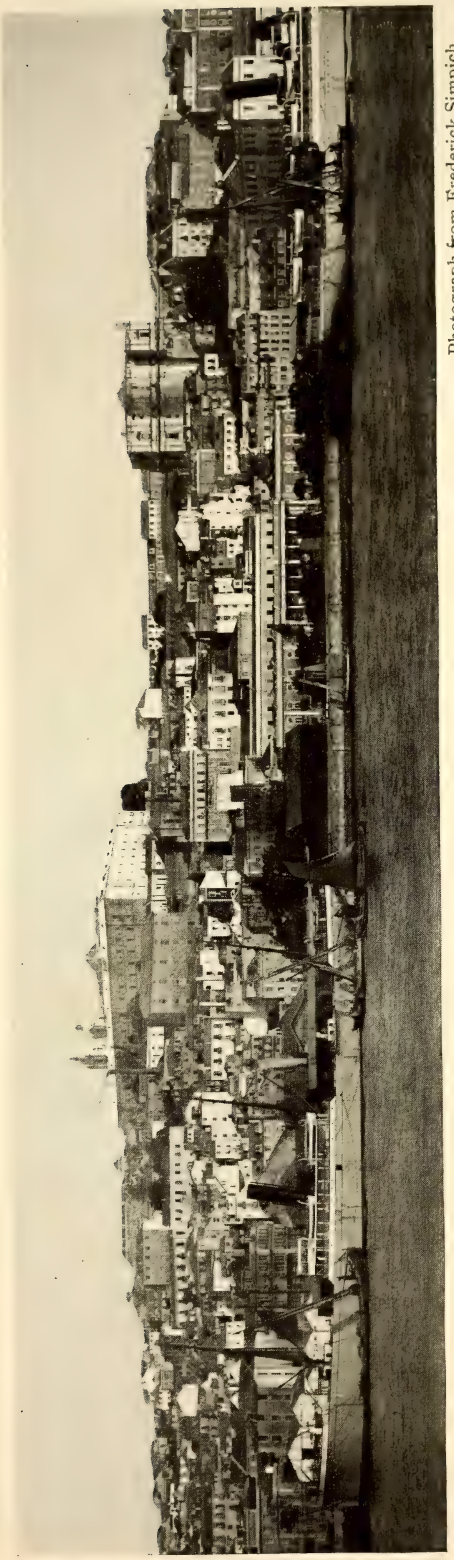
THE WATERFRONT OF LISBON GIVES THE HISTORY OF THE TAGUS IN TERMS OF BOAT CONSTRUCTION

Here are found various types of sailing craft, ancient and modern in design, and also the yawls and bateaux of the river fishermen and ferrymen. Some of these rowing craft are cumbersome and require the utmost skill on the part of the oarsmen, who dart in and out of the docks notwithstanding the ten-knot tide of the swiftly flowing river.

Photograph by A. W. Cutler

HAULING IN A SARDINE NET: A SCENE ON THE WATERFRONT AT LISBON

A goodly assortment of shipping in the River Tagus forms a background for the picture.



Photograph from Frederick Simpich

IN MASSES OF IVORY, ORANGE, AND RED, SHOT WITH SPLASHES OF WAXY GREEN FOLIAGE, LISBON RISES IN TERRACES FROM THE WATERFRONT TO ITS ELEVEN HILLS

Conspicuous on the sky-line are the barracks of the Fifth Infantry, once the Convento da Graça, behind which is hidden the Graça Church, only its two belfries showing.

of seashore one of the most charming in all Europe.

Such is the approach to Lisbon.

There, just abeam, is gem-like Cascaes, the ancient home of kings, palm-studded, brilliant with color. Citadel, monastery, antiquated forts, and palaces vie with magnificent residences in a gamut of architectural rivalry.

MONT' ESTORIL, GEM OF RESORTS

A short mile up the coast is the hamlet of Mont' Estoril, the most appealing of all resorts. Here is the acme of luxurious spas.

The mineral springs of Estoril became famous early in the 18th century, their fame increasing with the years. Hence the development of the little straggling village into a matchless garden spot, with palaces, casinos, and elaborate estates. The town is one immense bower of foliage and bloom. An unfailing water supply, permitting constant irrigation even during the driest seasons, rewards the horticulturist with the crispest leafage and the choicest flowers in a land of blossoms.

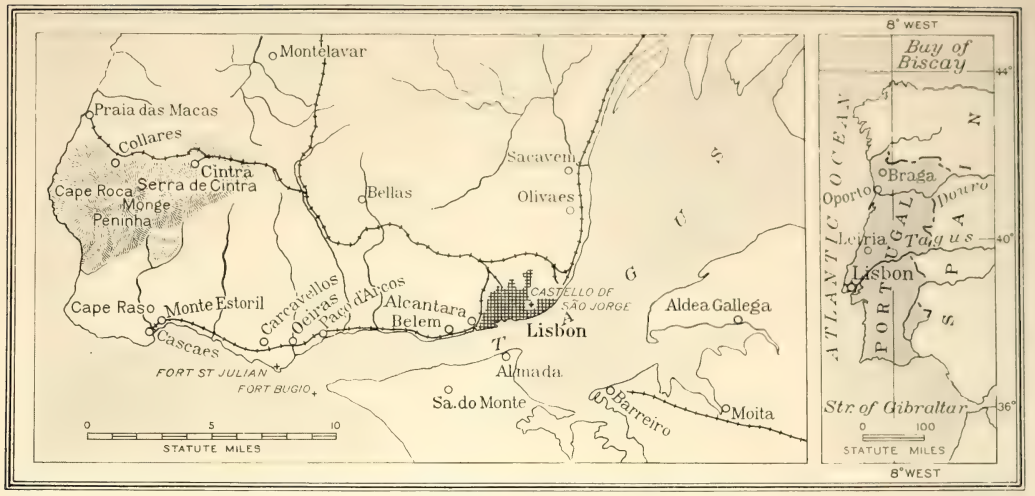
Geraniums multihued, roses of every shade, acacias, heliotrope, eucalyptus, broom, and palm line the streets, crowd the gardens, and screen to privacy the handsome villas along the slopes. Estoril is a riot of color, but among its blossom-scented terraces are quiet walks, shady arbors, and restful vistas of the spreading opal bay (see Color Plate I).

To avoid shoal water, dangerous to ships deep-laden, one must now steer to starboard farther into the bay. This change in direction brings the gleaming cupola of Estrella on the sky-line between Fort St. Julian and Fort Bugio, which straddle the channel. Shortly thereafter the Ajuda Palace comes out clear against

U. S. Navy Official Photograph

THE MOST FAMOUS OF SEAPLANES, THE NC-4, IN THE RIVER TAGUS

Just above the tail assembly of the plane may be seen the belfry and tower of the Sé, the oldest church in Lisbon, founded in the 4th century. Lisbon was the first "port of call" in Europe of the United States Navy's transatlantic pioneer, May 27, 1919 (see text, page 514).



Drawn by A. H. Bumstead

A MAP OF LISBON AND THE FRIENDLY BAY

The enthusiasm of those who have approached the Portuguese capital from the sea has given rise to the old saying that "he who has not seen Lisbon does not know what beauty is."

the sodded hillside in all its enormous bulk.

Down the hillside, below the palace, at the water's edge, is the unique old Tower of Belem, a relic of Manueline stonework, while at the right of Estrella's marble beacon looms the Castello de São Jorge, old, but bold and commanding (see illustration, page 513), and still farther to the right sparkles the roadstead.

TRAVERSING HISTORIC WATERS

The "Friendly Bay," so named by the Phœnicians, "Alisubbo" in their tongue, is filled with shipping. A certain well-known flag is much in evidence, for the harbor is dominated by a squadron of battleships of the United States Navy, their decks crowded with blue-clad middies on their annual practice cruise. Weirdly the gray-painted "basket-masts" of the huge battleships are silhouetted in line against the vine-draped slopes and banks of Almada, a suburb of Lisbon.

All this time the bay ahead is dotted with leg-o'-mutton fishing craft, boats just like the Phœnician boats of old, their sails many-hued, their prows turned up and carved and painted in fanciful style. Away off to the south you see them clustered over against Cape Espichel, and others trailing off into the mists which cover the broad reaches of Setubal Bay.

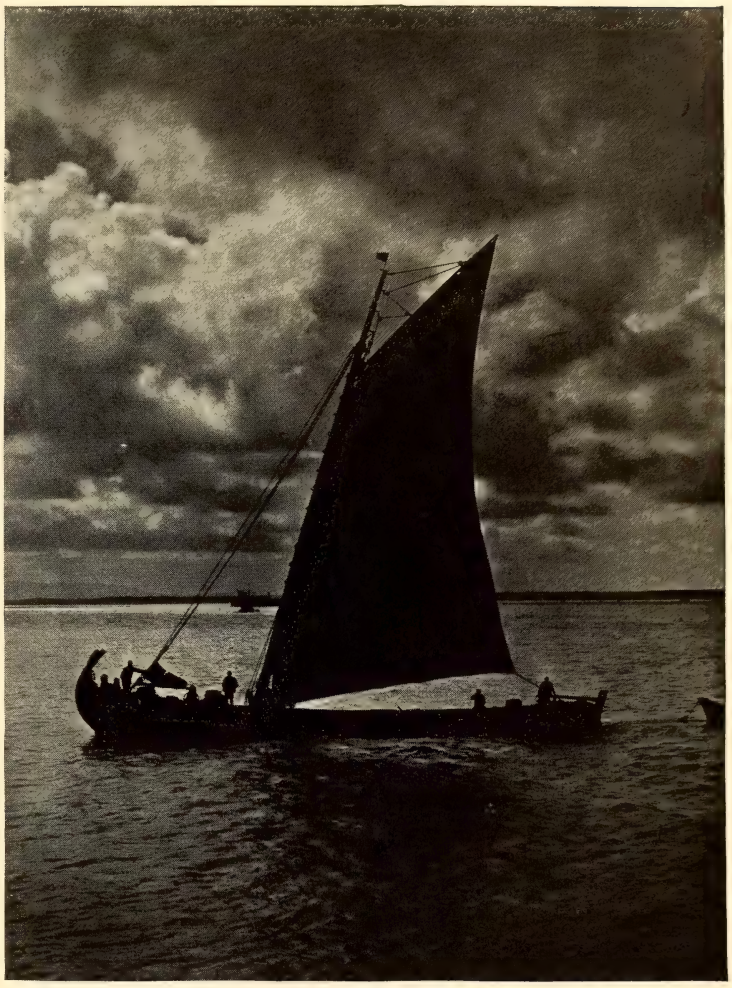
As we neared Lisbon Bar, off Fort Bugio, some one mentioned the fact that ages of history had left romantic telltales throughout this sunny land of Portugal, and that the very bay about us had a proud record in the annals of seafaring nations.

It's true. Your ship is traversing historic waters when entering the Tagus. Back and forth through these channels passed Greek, Phœnician, and Roman galleys and triremes; Moorish and Spanish caravels and galleons; the tree-banked rowing ships of northern Crusaders; the high-pooped, open-waisted sailing craft of Henry the Navigator, half-English, half-Portuguese landlubber prince that he was, while a long list of gallant sea-rovers and doughty, venturesome voyagers of the golden age of maritime romance knew the waters of the lower Tagus by heart.

One need only cull from school-day memory to find that history shows Lisbon and the Tagus to have played the strong "historical trump" in a number of epoch-making events. For one fact, the day of our arrival in the bay was the 424th anniversary of the departure of Vasco da Gama from Lisbon for India by way of the Cape of Good Hope on a voyage which tested the skill, courage, and faith of the great navigator and, by its successful conclusion, made him the Portuguese national hero of the age.

Again, 334 years ago the Invincible Armada of Spain and her vassal, Portugal, under the Duke of Medina Sidonia, gathered in the "Friendly Bay," and on May 20, 1588, swept down the Tagus to the sea with all the pomp of the mightiest empire of the age—a fleet of 130 ships, rating 57,868 tons, armed with 2,431 guns, and manned by 30,493 veterans of Spanish conquest.

The first sight of the Armada off the English coast was the signal for battle, and from that day, July 19, until the final great encounter off Gravelines, France, on July 29, the English fleet under Howard of Effingham and his lieutenants, Drake, Frobisher, and Hawkins, gave Sidonia a running fight which whittled his force to impotency, at the same time giving England the start which placed her in the proud and highly satisfactory position of Grandmother-in-Chief of the Seven Seas—a position she still enjoys



Photograph by A. W. Cutler

THE HULLS OF PRESENT-DAY PORTUGUESE FISHING-SMACKS HAVE THE LINES OF ANCIENT PHŒNICIAN CRAFT

Even the carving on the high prows proclaims the origin of these sturdy boats, which give a colorful interest to the waters of the Friendly Bay.

THE CITY RESEMBLES AN UNDULATING FIELD OF COLORED MARBLE

As our ship gained the offing south of Lisbon Bar, a rakish-rigged schooner "wore ship" under our very bow and slid alongside on the windward hand. On her quarter we read "Pilotos," and a queer legend, made up of letters and figures, reached nearly across her mildewed mainsail.

The dark-complexioned pilot once on board, his credentials as a member of the "Corporation of Pilots of the River Bar of Lisbon" duly acknowledged, and his right to collect five good American dollars for every foot of water our ship drew grudgingly admitted, we speeded up and pointed our steel prow in the direction of the channel between Point Lage on the port hand and Point Calha on the starboard, boundaries of the narrow gateway into Lisbon Harbor.

In a few moments we could see the tile-roofed heights of Lisbon. With that sky and that sunlight the city shone like an

Photograph by A. W. Cutler

A REMARKABLY FINE VIEW OF THE HANGING GARDENS OF PEDRO DO ALCÁNTARA

The upper garden and praça are at the left, behind the wrought-iron fence. The Cidade Baixa, or "low city," lies off to the right, down the hill. Lisbon has many pretty little gardens like this one, though few show such a collection of palm trees. It is situated at the summit of the very steep hill known as the Calçada da Gloria.

Photograph by Edgar K. Frank

ACROSS THE CIDADE BAIXA FROM THE "HANGING GARDENS" OF PEDRO DO ALCÁNTARA

From this point the Castello São Jorge looms high and commanding. Here the Moors began their city, and here the great earthquake of 1755 spent its force, vainly, for the buildings are a thousand years old.

immense field of undulating colored marble set with jewels and precious stones.

Few towers or pinnacles accentuate the city's vivid sky-line. They are not needed. The natural contour of the site on which the city spreads its marble and tile loveliness affords a sky-line in itself of singular impressiveness.

Lisbon is unique in this respect. Nature has saved the Lisbonese the trouble and expense of rearing lofty domes and minarets. Eleven hills, set down like giant chessmen beside the Tagus, covered with gleaming buildings, immense gardens, and rambling palaces and battlements, would not gain much by the addition of incongruous towers hostile to the prevailing architectural style.

A MIGHTY TIDE IN THE "FRIENDLY BAY"

Passing through the narrows and swinging to the right along the depths of the main ship channel, we soon gained our anchorage.

No sooner had we moored ship than it became evident that a mighty tide flows in and out of the "Friendly Bay." On this occasion the tide was outward bound and making a "good" ten knots. We tailed straight down stream, although a strong breeze was blowing in from the sea.

There is nothing particularly strange about this when one considers that the bay or estuary of the Tagus opposite the city is but little more than a mile wide, while immediately above it opens out to a tidal lake from four to eight miles wide and nearly twelve miles long. The water in this lake is very deep; consequently there is a tremendous volume, requiring an outlet and inlet through the estuary with each rise and fall of the tide, while behind it all is the onrush of the Tagus itself, bearing the run-off from an enormous area.

The Tagus is one of the really great rivers of the Iberian Peninsula. It rises in eastern Spain, among the Sierra de Albarracin, in the Province of Teruel, hardly sixty miles from the Mediterranean; thus it flows nearly the whole

Photograph by Clifford Albion Tinker

A MUNICIPAL STREET ELEVATOR IN LISBON

This is one of the methods of gaining the heights of the city from the lower levels of the Cidade; it is one of the best methods and is never lacking in patronage. From the Rua da Santa Justa this *ascensore* rises to the iron bridge spanning the Chiado and leading to the Largo do Carmo, eight or nine stories above the "shopping district."

width of the peninsula. Far-famed Toledo is on its banks, and beautiful Alcántara also.

ALMADA IS LISBON'S BROOKLYN

Our ship was moored a short distance off the docks of Almada, a full mile, however, from the public landings of the Praça do Commercio on the Lisbon side of the estuary.

Almada is a modest suburb of Lisbon. From the ship we could see a small town hanging by its eyelash, so to speak, from a green and yellow hillside. An old fort crowns a hill to the eastward, and a range of quaint houses, broken by several garden-like *praças*, or squares, lies between the mouldering barricade and the interesting old chapel of São Paulo, perched on another little hillock to the west. Dwarfed replicas of British Channel packet-boats ply as ferry craft between Lisbon and this miniature Brooklyn.

Almada is not without its claims to fame. English Crusaders settled here in fairly large numbers after the capture of Lisbon from the Moors in 1147. The followers of the Cross, delayed en route to the Holy Land, glad of an opportunity to deal the Moslems a body-blow, joined the Portuguese forces of Dom Affonso Henriques, sailed into the Tagus, and drove the Moors out of Lisbon into the mountains back of Cintra.

Directly in line between our ship and the praça, swinging and bobbing in the choppy tide, was the selfsame mooring buoy to which the NC-4 was made fast on May 27, 1919, when she landed in the Tagus after winging her way across the Atlantic, the first aircraft of any type to join America and Europe by the aërial route.* Her skipper, Commander Albert C. Read, U. S. N., the "Columbus of the Air," reversing the voyage of Columbus of old, made Lisbon the 20th-century San Salvador. Nothing can rob the city of that distinction.

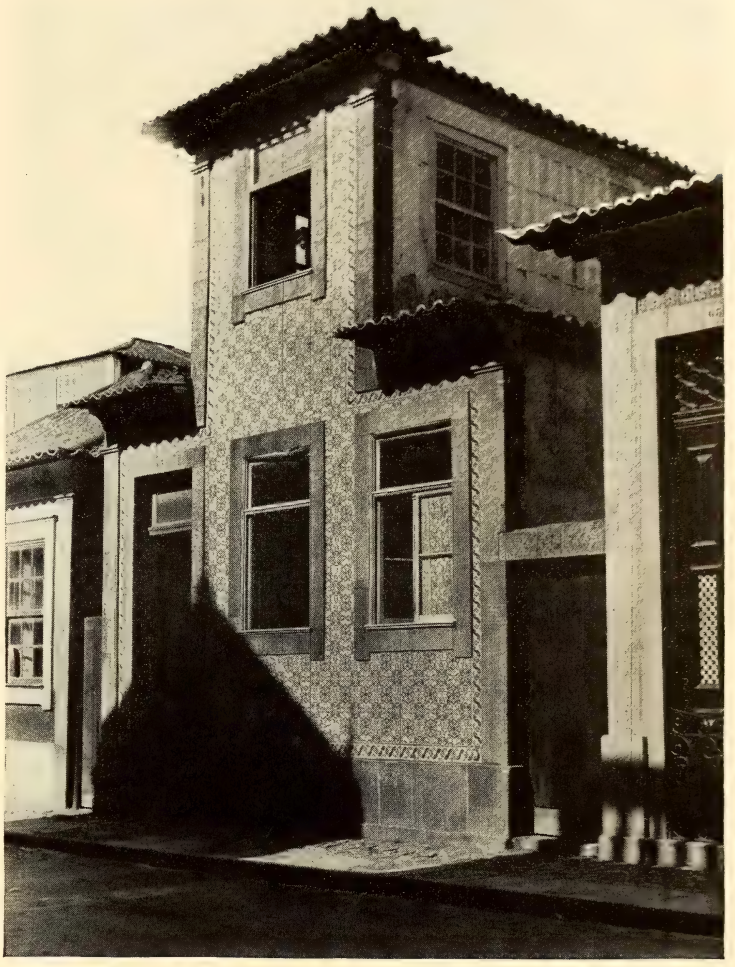
* See "The Azores, Half-way House of American Transatlantic Aviators," by Arminius T. Haeberle, in THE GEOGRAPHIC for June, 1919.

The Lisbonese call Read the reincarnation of Vasco da Gama. Pride in their share in the historical air voyage is only equaled by their hope that Lisbon will become a leading airport for future transatlantic commercial airliners. Who shall say that such a hope will not reach fruition?

A PHŒNIX AMONG CITIES

From the ship's deck the whole waterfront of Lisbon was visible; twelve miles of clean shoreline stretched out before us. To the west one could see as far down the coast as the green-gold suburb of Paço d'Arcos and the little hill-town of Carcavellos perched above it, although a mile or two beyond.

To the east, up the Tagus, the eye followed the city until it swept out of sight in a great bend to the northward beyond the noble buildings of the Asylo de Dona Maria Pia. In direct line behind the Ajuda Palace loomed the "Paps," three hilltops, each between four and five hundred feet high—one topped by a beacon for the benefit of mariners coming up the river channel, and one by a wireless station which keeps Lisbon in touch with the world beyond the seas.



Photograph by A. W. Cutler

A PORTUGUESE HOUSE DECORATED WITH COLORED TILES

Some of the patterns of these tile decorations look like the paper which adorns a well-kept bath-room.

Looking at the beautiful city, strung out for miles along the heights above the swiftly flowing river, one can scarcely credit the fact that the cruel earthquake of 1755 all but wiped it out of existence; that nearly all the buildings between the Ajuda and the Castle of St. George have been built since that date. Yet such is the case. Lisbon is a Phœnix among cities.

Then came the sunset. Not a cloud besmirched the sky. Not a single brilliant ray from that ruddy gold disk missed its mark on the heights before us. The splendor of the scene was heightened by a background of rose-tinted summer sky. No wonder the Moors coveted this region. Their luxury-loving Semitic minds saw in Lisbon, the "Felicitas Julia" of the Romans, a new and opulent capital for their growing European empire.

Having gained possession of the city, they dropped the Roman name and gave it one of their own; but it was still the

"City of the Friendly Bay"—in the Moorish tongue, "Al Aschbuna." From this Moorish name was derived the later mongrel name "Lissabona," and upon the complete subjugation of the region by the Portuguese this later name became the present "Lisboa," with its Anglicized version, "Lisbon."

THE HEART OF LISBON

As the sun's dip over the crest of the western hills brought twilight shadows across the city, I put ashore at the Praça landing. Sardine fishing cutters and smacks filled the basin along the seawall, their sails like Joseph's coat of many colors, while running boats from the squadron in the harbor monopolized the landing steps on either side of the square.

Once ashore and striding across the huge square, flanked as it is on three sides by magnificently colonnaded buildings, a triumphal arch of monumental proportions on the side opposite the river bank and a striking equestrian statue in the center, one wonders why other large seaports do not do these things, and why beauty and practicability are not more often wedded in municipal undertakings, especially waterfront undertakings.

The Praça do Commercio, once famous as the Terreiro do Paço, or place of the palace, known to sailors the world over as "Black Horse Square"—this last because of the statue—is one of the rebuilding projects of the Marquez de Pombal, to whom Lisbon owes her rebirth after the catastrophe of 1755.

The bronze horseman and steed in the Praça are effigies of King José and his favorite charger. The great Government buildings which flank the square on three sides are the Chamber of Commerce, the Palace of Justice, the Customhouse, the House of India, the General Post Office, the War Office, and other administrative departments. These magnificent buildings of the Pombaline style cover the former site of the Government Palace, the Caza da India, the Opera, and the grand Library of Old Lisbon, all shattered by the earthquake.

A MODEL OF CITY PLANNING AND OF CLEANLINESS

Passing under the triumphal arch, one immediately finds himself in one of the cleanest and most interesting cities in Latin Europe. It is clean in more respects than the mere absence of rubbish in the streets. To be sure, the streets are clean, for Lisbon has one of the best sewerage systems of any European city; it also has a wonderful water-supply system, thanks to Pombal. The buildings are clean, the shops are clean; so are the shopkeepers and their stocks. The street urchins are clean; yes, and so are the ragged beggars.

But, what counts most, Lisbon, as Latin or southern European cities go, is morally clean. It is not immaculate or sinless, but no large city abroad has fewer homicides, less thieving, or is troubled with social problems of such insignificance in comparison.

Lisbon is interesting as a study in municipal planning. It is an index of the versatile mind of its builder, Pombal, who was in mental combination an engineer, an architect, a financier, an administrator, and man of vision. His civic schemes were a century, and in some details two centuries, in advance of contemporary builders. The rest of Europe has hardly caught up with his building methods. His laws for the construction of buildings to forestall damage by earthquake tremors and shocks are still enforced, and they have saved the city several times since his day.

THE PORTUGUESE LANGUAGE IS DERIVED FROM MANY SOURCES

Lisbon is further interesting to visitors because of the conglomerate population within its limits. Here may be seen representatives of all the various nationalities which, fluxed into homogeneity, characterize the urban population of Portugal to-day.

The Portuguese language is like the Portuguese race, polygenetic. Ancient Greek, ancient and low Latin, Spanish, Gallegan, French, Moorish, a strong Celtic influence, and certain borrowings from the Hebrew, East Indian, and aboriginal Brazilian, together with some obscure items, such as two diphthongs from the Chinese, go to make up the grammatical construction, etymology, and pronunciation of modern Portuguese.

All of the above variants are easily identified in the language and show the

Photograph by A. W. Cutler

IN THE HEART OF THE PORTUGUESE RIVIERA

Monte Estoril, nestling in a ring of hills on the seashore near Lisbon, is a favorite summer resort of wealthy residents of the Portuguese capital. It is bowered in a profusion of subtropical fruits and flowers, which provide an enchanting setting for its palatial villas.

Photograph by A. W. Cutler

WHERE WATER AND GOSSIP FLOW IN OPORTO

Even the women of bronze put their heads together for sociable chatter at Oporto's famous sculptured fountains. The water casks used by the women in carrying home their supply are called canecas. The pad of cloth on top of the head is used to steady the burden.

Photograph by A. W. Cutler

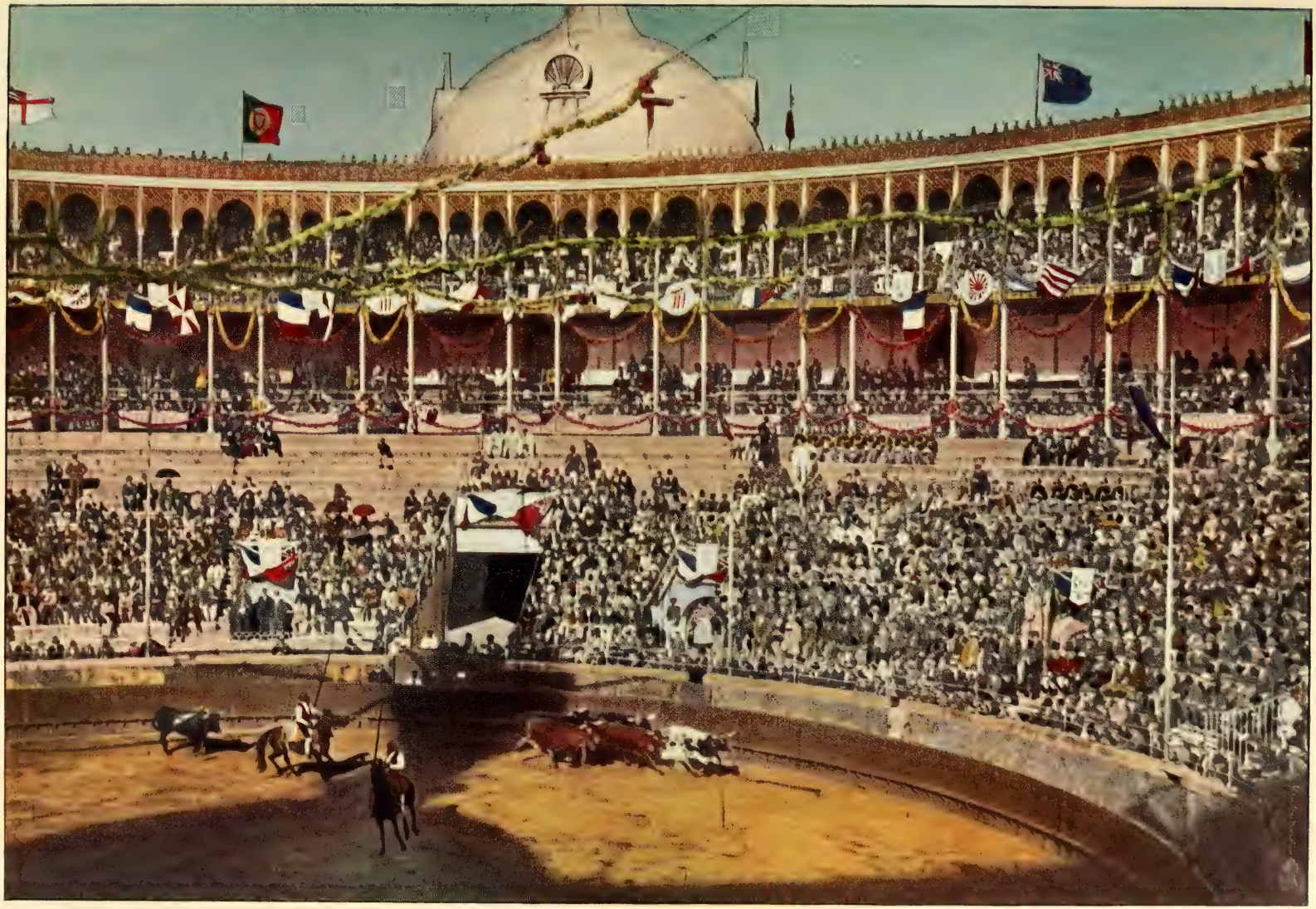
ON THE BANKS OF THE DOURO

With Oporto rising in tinted terraces across the river, this Portuguese mother rests for a moment from her task of loading and unloading the river boats. She bears most of her burdens of brick, coal, and casks of wine on her head. The baby in the basket is left to himself during most of the long day.

Photograph by A. W. Cutler

PORTUGAL'S FINEST VIEW: THE MARIA PIA BRIDGE OVER THE DOURO RIVER
SEEN FROM THE ALAMEDA DAS FONTAINHAS, OPORTO

From this favorite promenade the orange and fig trees, the trailing vines, and the pink and blue tiled houses clamber pleasingly up the banks of the river. The flat-bottomed boats, driven by a single square sail, handle yearly thousands of casks of that mellow red wine which made Oporto famous.



Photograph by A. W. Cutler

LISBON AT THE BULL RING

The Portuguese bullfight is a far more humane sport than Spain's exhibition of blood and sand. A skilled horse and rider pit their wiles against those of the bull, whose horns are usually cut and padded. When the fun has lasted about ten minutes, a number of cows are also admitted to the ring, as here seen, and the bull mingles with them while horsemen try to pick the banderillas off the animal's back with the aid of their long sticks.

©

Photograph by A. W. Cutler

AT ONE OF BRAGA'S FOUNTAIN SHRINES

The famous church of Bom Jesus do Monte, which commands the top of a terraced mountain, is visited annually at Whitsuntide by thousands of pilgrims. On each of the terraces there is a fountain shrine.

©

Photograph by A. W. Cutler

"HOMEWARD SHE DRIVES BEFORE THE FAVORING GALE"

A large share of Portugal's exports and imports passes through the busy harbor of Oporto, and the Douro River is usually dotted with native boats. The twin-sail distinguishes the cargo-boat from the wine craft with its single square of canvas.

Photograph by A. W. Cutler

THRIVING IN PORTUGAL'S GENIAL SUNSHINE

Poverty has no gloom for these ragged, homeless gamins who doze in the sheltered doorways of the churches and glean their food in the market place. Actual want among them is rare, and they are care-free and happy.

Photograph by A. W. Cutler

WOMEN OF AFFIFE IN THEIR SUNDAY BEST

The overskirt and the headdress belong to the original picturesque costume of the northern part of Portugal, but the quaint, ornamented little waistcoat is missing, indicative of the fact that the fascinating native dress is dying out.

©

Photograph by A. W. Cutler

PASSING THE TIME OF DAY IN LEIRIA

The woman on the right has tucked her raincoat over her arm and is plaiting some straw as she goes along the street. Before consenting to be photographed, she dispensed with her workbag by putting it on her head.

©

Photograph by A. W. Cutler

A PORTUGUESE PEASANT'S PRIZED POSSESSIONS WEARING THE FAMILY HEIRLOOM

A team of fine oxen is a small fortune to the farmer of Portugal. They are never sold, but are handed down in the family as heirlooms. The curiously carved yokes of this country date back to the Moorish occupation. The one shown in this picture antedates the American Revolution by a quarter of a century.

Photograph by A. W. Cutler

A SHEPHERD AND SHEPHERDESS OF CENTRAL PORTUGAL

The girl carries a branch laden with oranges and a kerchief full of freshly picked fruit. He wears sheepskin "chaps" over his trousers.

Photograph by A. W. Cutler

AFTER A DAY IN THE MARKET AT LEIRIA

These peasant women have paused beneath the old convent which overlooks the village of Leiria, once the capital of Portugal and the home of the first Portuguese printing press.

Photograph from Ruth Kedzie Woods

BELLES OF MINHO

The loveliness of the women in the province of Minho is a theme for a poet. The grace and witchery of their persons, the unsurpassed coloring and weaving of their costumes, and the splendor of their heavy golden ornaments are celebrated throughout Portugal.

Photograph by A. W. Cutler

MOTHER NECESSITY INVENTS A STEPLADDER

This youth, with the aid of his sister, is filling his basket with oranges, for which he finds a ready market among the pilgrims and foreign visitors to their renowned shrine on the top of Bom Jesus do Monte, in the city of Braga.

Photograph by A. W. Cutler

SHE WEARS HER WEALTH UPON HER HEAD

Women in Portugal bear many a burden on their heads with grace and ease. This housewife was reticent about being photographed, but the fowls were in a flutter over the unusual experience. The barred window is a reminder of the Moorish occupation of the country.

influence of alien hybridization in a land under colonization by strange peoples. At the same time it shows the adaptability of a race which has itself extended its influence to remote places "in the sun."

CONQUERING RACES MADE SMALL IMPRESS ON THE INTERIOR

The prolonged visits of the Phœnicians, Visigoths, Romans, Moors, and Spanish had little effect or influence on the stock of the Celtic-Iberian folk in the interior and mountainous districts of Portugal, while along the coasts the cities absorbed all those strangers into its urban life. The conquerors fell victims to racial absorption.

Consequently in Lisbon, often invaded and brought under alien rule, are found types which distinctly betray their origin from one or another of the shifting dominant races. Pure Celts from the hills are met on the streets, their pugnacious visages markedly Bretonesque, their costumes like all Celtic raiment, and their side whiskers just as bristly. Traces of imported Negro slave blood are distinguishable, as also are Jewish types, descendants of the refugees from Spain.

One marvels at the strength of limb and neck of the basket-peddler girls, whose profiles, complexions, hair, and stature find a parallel in the descriptions of the Phœnician women of old. Some of these young women are beauties, and they carry rush-woven baskets of fruit, fish, or vegetables poised on their heads with a certain grace which lifts their occupation above drudgery, while, except in the case of the aged, they cry their wares in full-throated melody (see Color Plate XVI).

Striking Moorish types are also often seen, dark-skinned, with the black-bronze hair, large, brilliant black eyes, and pearly teeth of their ancestors. They lack, of course, the thick lips and flat noses of the African types from more tropical regions than the Mediterranean coast.

But by far the greater number of people on the streets are "Portuguese," a race in which is combined something from each of a long list of descendants of successive invaders. They are clean-limbed, regular-featured, medium-sized people of fine appearance. Their type is somewhat akin to the Greek, but they are more swarthy and also more urbane, even-tempered, and cordial.

Portuguese of the upper classes are among the most cultured and gracious people of the world. Hospitality is a characteristic, generosity also, and the arts, sciences, and ethics of civilization are appreciated and employed. Portuguese men engaged in business and commerce are cosmopolitan in the range of their operations and in the compass of their influence.

All the linguistic inheritances and racial divergences of the Portuguese have a direct influence on the life, architecture, and economics of the city. The most ancient of customs and the most antique of implements are found side by side with electric cars, automobiles, modern banking houses, luxuriously furnished homes, and ultra styles.

Yet so perfectly natural and unaffected are the people that nothing seems strange or out of place. The city is a mosaic of civilization; harsh and glaring antagonisms have melted into the picture.

EARTHQUAKE OF 1755 MARKED BEGINNING OF MODERN LISBON

Following the great earthquake of 1755 and the rise of Pombal, modernity took root in Portugal. Pombal had been Minister to England and to Austria and Minister of Foreign Affairs; his contact with progressive nations, particularly with two of the leading courts of the time, bore fruit along practical lines.

Every square foot of Lisbon, excepting the Alfama district, the old town which survived the earthquake, gives evidence of a master mind in careful planning which took advantage of every contour of the site and also had due regard for the monumental requirements of a capital city.

From the Triumphal Arch of the Praça to the Rocío, or Praça de Dom Pedro Quarto, one traverses that part of the new city, the Cidade Baixa, planned to be the location for genteel shops and high-grade mercantile houses. Eight parallel streets running north and south, crossed by eight others running east and west, make a checkerboard district accessible from all sides, and in the mind of Pombal, who gave the streets names suggestive of the trades and industries to be housed

U. S. Navy Official Photograph

BEACH PATROL OF AMERICAN SAILORS IN FRONT OF THE STATUE OF KING JOSÉ

The equestrian statue gives to this famous square the name of "Black Horse Square." The triumphal arch in the background leads from the Praça do Commercio to the Cidade Baixa. These sailors were on patrol in Lisbon when the world-renowned NC-4 reached that city after her flight across the Atlantic.

thereon, this would be the shopping section de luxe of Lisbon.

POMBAL'S SCHEME MODIFIED IN RECENT YEARS

Until about 1890 Pombal's plan was adhered to, but since that date the adoption and extension of electric car lines has made other parts of the growing city regional trading centers, and fine shops are scattered here and there along the avenues and in less congested sections.

The best examples of Pombaline construction designed to resist earthquake shocks lie in this section of the Cidade. The business buildings which house the banks, jewelry stores, trading shops of all kinds, and offices are built of light materials, with walls covered with ceramic tile. Base stories are frequently constructed of stone, but one sees four- and six-story buildings lighter than the average two-story loft building in America.

The tile covering is generally in small sections, six to eight inches square, and highly colored in most instances—blues, greens, yellows, and browns.

The use of tile wall space is a universal complaint with Portuguese architects, but it is a matter of law in Lisbon—light

Photograph by A. W. Cutler

LISBON HAS MANY BEAUTIFUL STATUES TO ITS WORTHY DEAD

A circular plot of ground, attractively decorated with flowers and shaded by palm trees, commemorates the achievements of Eça de Quiroz, a writer of note.

materials above the first story must be used.

There are compensations, however; little monotony is noticeable, colors are used with skill, and tile makes for cleanliness and fire retardation. One house in the Alcántara district is of elaborate design. At first, seen from a distance, it suggests Italian sgraffito plaster-work, but closer examination reveals glazed tile with patterns worked into arabesques and panels presenting intricate scrolls and figures of Grecian maidens and court ladies of later periods, the whole a highly colored composition.

GREAT ELEVATORS ARE A PART OF THE CITY'S RAPID TRANSIT SYSTEM

How to gain the heights on either side of the Cidade is a matter of some concern to strangers. One may, of course, walk, but to the casual visitor this is a back-breaking method. Other schemes include more intriguing methods. Cog-wheel electric cars ply up and down the inclined portions of the hillsides, but

U. S. Navy Official Photograph

THE ROCÍO, OR PRAÇA DE DOM PEDRO QUARTO, BETTER KNOWN AS "ROLLING-MOTION SQUARE"

The remarkable mosaic pavement gives the pedestrian a feeling of undulation. Surmounting the column in the center is a bronze statue of Dom Pedro, Emperor of Brazil and King of Portugal, while at the far end of the praça is the theater of Dona Maria II, occupying the site of the medieval prison and trial court. At the right, above the roofs of the buildings bounding the east side of the praça, is seen the sculptured gable of the Church of São Domingos, the largest in Lisbon.

Photograph by A. W. Cutler

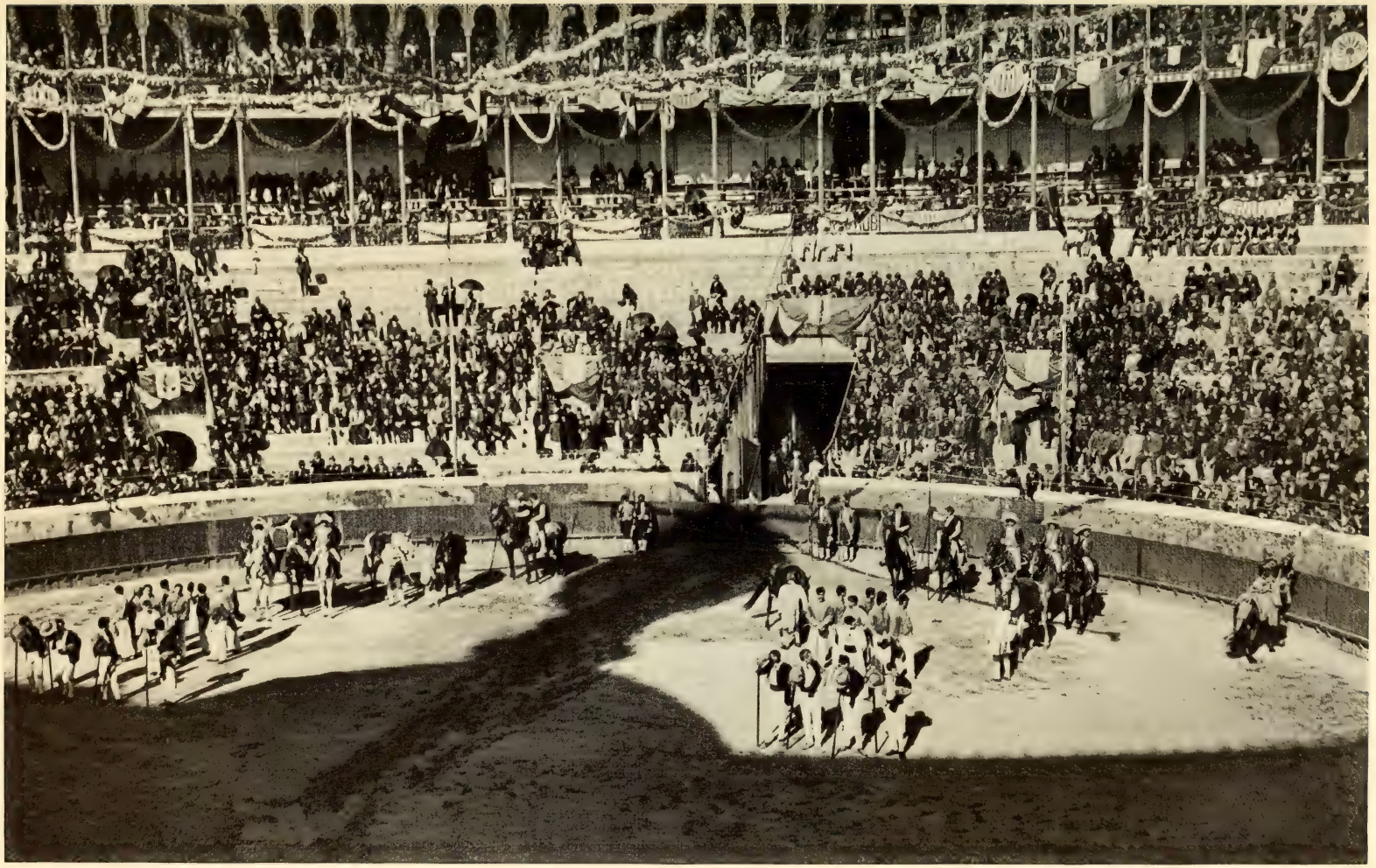
AMERICAN AND BRITISH SAILORS IN PROCESSION ON PORTUGAL'S UNKNOWN WARRIOR DAY

Like her sister allies in the World War, Portugal has paid her homage to an Unknown Soldier. The scene is the Rocio (see also illustration on opposite page).

Photograph by A. W. Cutler

THE AVENIDA DA LIBERDADE, THE FINEST THOROUGHFARE OF PORTUGAL'S CAPITAL

The broad street is lined with palms and red-flowering Judas trees. The central monument was erected by public subscription in 1882, and commemorates the revolution of December 1, 1640, when Portugal was freed from Spanish rule (see text, page 545).



Photograph by A. W. Cutler

OPENING CEREMONIES AT A GALA BULL-FIGHT AT CAMPO PEQUENO, LISBON'S FINEST BULL-RING

The men in front are banderilleros. It is their business to place darts (banderillas) in the neck of the bull when he charges. The men behind are known as campanos. They do a lot of rough-and-tumble work, and an exciting feature of a Portuguese bull-fight is to let in a fresh bull on a group of these campanos, who must rely on each other to attract the attention of the animal when one of their number is chased. Finally the bull is seized by the horns and eventually overpowered. The horsemen wearing hats are heralds; after saluting at the President's box they disappear and do not return. The other men on horseback, with the immensely long sticks, are also campanos (see also Color Plate V).

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TYPICAL OF LISBON

Typical of its stores, its newer business buildings, designed to resist earthquakes, and its methods of transportation. It is not difficult to believe that Lisbon is a clean city when this photograph is studied.

where the banks are sheer and perpendicular huge elevators (*ascensores*) have been installed (see illustration, page 514).

To go from the shopping district of the Cidade direct to the upper elevations of the Alcántara district to the west, one need only board the ascensore in the Rua da Santa Justa and take a hop up to the iron bridge leading to the Largo do Carmo.

This giant lift is not a thing of beauty, but it is useful in the extreme. The bridge from the ascensore to the Largo is high above the Chiado, Lisbon's Fifth Avenue, but an intermediate stage permits one to alight on a level with that street of high-priced shops and restaurants.

By this lift method one may visit three or four levels in as many minutes, but if attempting to climb by the ordinary routes, via winding streets or immense flights of stone steps, one needs time—and wind.

One may run the risk of being arrested for cruelty to animals by engaging a hack and endeavoring to reach the top of a neighboring district sitting behind a struggling little beast, more pony than horse, whose desperate efforts to make altitude are patent to all the besabered policemen along the line of march. Of course, one may assist the driver to swear or moan, as the case may be, in momentary expectation of seeing the poor horse settle down on his beam ends and slide to the foot of the hill, there to be carted off to the town pound, while driver and passenger fall into the hands of the authorities.

Taxicabs are much in demand for getting about the mountainous streets of Lisbon. All the American "brands" of automobiles are to be found at the stands.

The eight streets running north and south in the Cidade pour into the Rocío and the Praça da Figueira. The Rocío is a beautiful square, remarkable for its

Photograph by A. W. Cutler

A VENDER OF KEROSENE ON HIS MORNING ROUND IN LISBON

pavement, laid in a mosaic pattern which produces an optical illusion responsible for its popular nickname, "Rolling-Motion Square" (see pages 536-537).

A THEATER GRACES THE MEDIEVAL PRISON SITE

A large column in the center of the Rocío supports a bronze statue of Dom Pedro IV, one-time Emperor of Brazil and King of Portugal. Two bronze fountains, equidistant from the column at either end of the square, preserve its symmetry and afford bathtubs for all the pigeons in Estremadura Province.

At the north end of the square is the imposing theater of Dona Maria II, remarkable successor of the trial court and medieval prison—a place of horrors which has become a place of enjoyment. The other sides of the square are bounded by streets with mercantile establishments. Double rows of vigorous trees on the east and west sides add the shade so necessary to the public enjoyment of parks and plazas.

From the northwest corner of the Rocío one enters the Largo de Camões, a small square, on the west side of which is the Central Railway Station and the Avenida Palace Hotel, two important buildings from the traveler's standpoint. The Largo is really a connecting plaza between the Rocío and the Avenida da Liberdade, the Champs Elysées of Lisbon. With the Rocío and the Avenida begins the formal and semi-official section of the Cidade Baixa.

Only students of Portuguese history may understand the real significance of the names of streets, avenues, parks, and buildings in this section of the city. Its beauty is another matter; all may see it who will.

SQUARE AND AVENUE COMMEMORATE GREAT EVENT

Although the "new city," the Baixa is not without its charm. The skill of architects, horticulturists, and silviculturists has been lavished upon it; so also has the artistry of sculptors and gardeners and the ingenuity of municipal engineers. In consequence, the whole district is a delight. Starting at the south end of the Avenida, at the Praça dos Restauradores, a park-like thoroughfare leads straight out to the plateau of Estremadura.

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THE BATTLE WITH DIRT IN LISBON

The washboard is a piece of rock and the washing process a test of muscle, cloth, and womanly patience. This laundry scene is one of the most interesting bits of domestic economy in Lisbon; everything is free except the soap and the clothes.

Photograph by A. W. Cutler

THE FISH MARKET OF LISBON

HAULING IN AN EMPTY SARDINE NET ON THE LISBON WATERFRONT

Photographs by A. W. Cutler

THE FISHER GIRLS OF LISBON SQUAT ON THE GROUND WHEN MAKING A SALE

These fisher girls are a distinct class. Their mothers and grandmothers before them sold fish in this way, and the children of these girls and their children's children will do the same.

Praça dos Restauradores, a lovely little square, and Avenida da Liberdade contain in their names the summing up of a great epoch in the national life of the nation — Restauradores and Liberdade — two words meaning the restorers and liberty. The square and the avenue commemorate the heroic struggle against Spain from the 14th to the 17th century, culminating in the Portuguese Day of Independence on December 1, 1640.

The beautiful Obelisk in the Praça, ninety feet high, mounted on a sculptured pedestal and lettered in bronze with the names of the principal battles of the restoration, is a national shrine.

From this point stretch avenues of trees, myriads of flowering shrubs, subtropical plants, palms, kiosks, bandstands, flower beds, fountains, rockeries, statuary, promenades, grottoes, and every appealing construction and growth to attract, not only human beings, but all manner of birds and insects. The Avenida shrills with the songs of birds and hums with the drone of bees; butterflies flit among its vivid blooms and colored fish sport in its pools and fountains.

Photograph by A. W. Cutler

A DEAL IN FISH

This scene was recorded before the "victims" became aware of the presence of the camera man, and it is accordingly a true picture of a phase of Portuguese life at the capital.

Bordering the Avenida are hotels, theaters, cafés, shops, and, as one leaves the vicinity of the Obelisk, residences and clubs. At the north end of the great boulevard is the immense circular Praça Marquez Pombal and, just beyond, the beautiful Parque Eduardo VII, a veritable fairyland of trees, shrubs, flowers, and ponds. Farther out, by way of the Avenida Antonio Augusto de Aguir, one comes to the Zoölogical Gardens, perhaps the finest in southern Europe.

THE NIGHT LIFE OF LISBON

At night the Avenida becomes a kind of out-of-doors theater. Lighted by row upon row of electric standards, it is used as a promenade as freely as at noonday. Band concerts are given nightly and beer gardens are open for business in the vicinity of the musicians.

Delightful are the summer evenings in Lisbon. Aside from the real enjoyment

Photograph by A. W. Cutler

A FISHER GIRL OF FORTY

She refused persistently all offers to permit this picture to be taken until finally her friends in the crowd of onlookers threatened never to speak to her again if she still persisted in declining the substantial sum promised by the photographer. So she succumbed, and this is the result.

of the shifting scene on the Avenida, the very air is charged with mildly invigorating ozone, welcome after the heat of midday. The stars shine brighter than in less clear atmosphere, and twinkling lights from the hillsides contrast pleasingly with the glare of automobile headlights flashing through streets seemingly among the clouds.

Night-life indoors, like night-life in cities the world over, has its devotees in Lisbon. Theaters are numerous and a great opera house, closed in summer, stands near the Chiado. A large number of vaudeville shows prosper, and cinemas are most popular, American motion-picture stars being the prime favorites.

Dance halls and dansant cafés are not numerous. Only a few such institutions of respectability and prominence are to be found in operation during the summer season.

A VISIT TO ALFAMA, A TANGLE OF NARROW STREETS

In direct contrast to the level Baixa, with its wide streets, broad avenues, and beautiful plaza, the Alfama is a rough old hill, furrowed by a network of narrow, winding alleys and would-be streets running in an indescribable tangle.

On the very top of the hill stands the ancient Moorish pile now called the Castle of St. George. Although a barrack and military prison, it is hallowed by centuries of history and is an object of veneration to all Portuguese. One may ride to within a few blocks of the Castle by taking a tram, or "electricos," near the Triumphal Arch of the Praça do Commercio.

The tram passes the Sé or Cathedral of Santa Maria, the oldest church in Lisbon. Said to have been founded miraculously in the year 306, this old building site has been dedicated to pagan gods, has borne a mosque on its foundation stones, and has known several churches and cathedrals. The one now standing is being restored.

I went about this hill and old city by "jitney." It was an experience The buildings are antiques of remote times—churches, shops, dwellings, towers, hospitals, barracks, stables, hovels, and what-not, cast about in a jumble of plaster, stone, tile, adobe, and cobbles.

Photograph by A. W. Cutler

A SARDINE MERCHANT OF LISBON

She feels more at home with her basket on her head. This little maid was one of the very few subjects who willingly posed for her picture. Her smile reveals the even white teeth for which the Portuguese peasantry are noted.

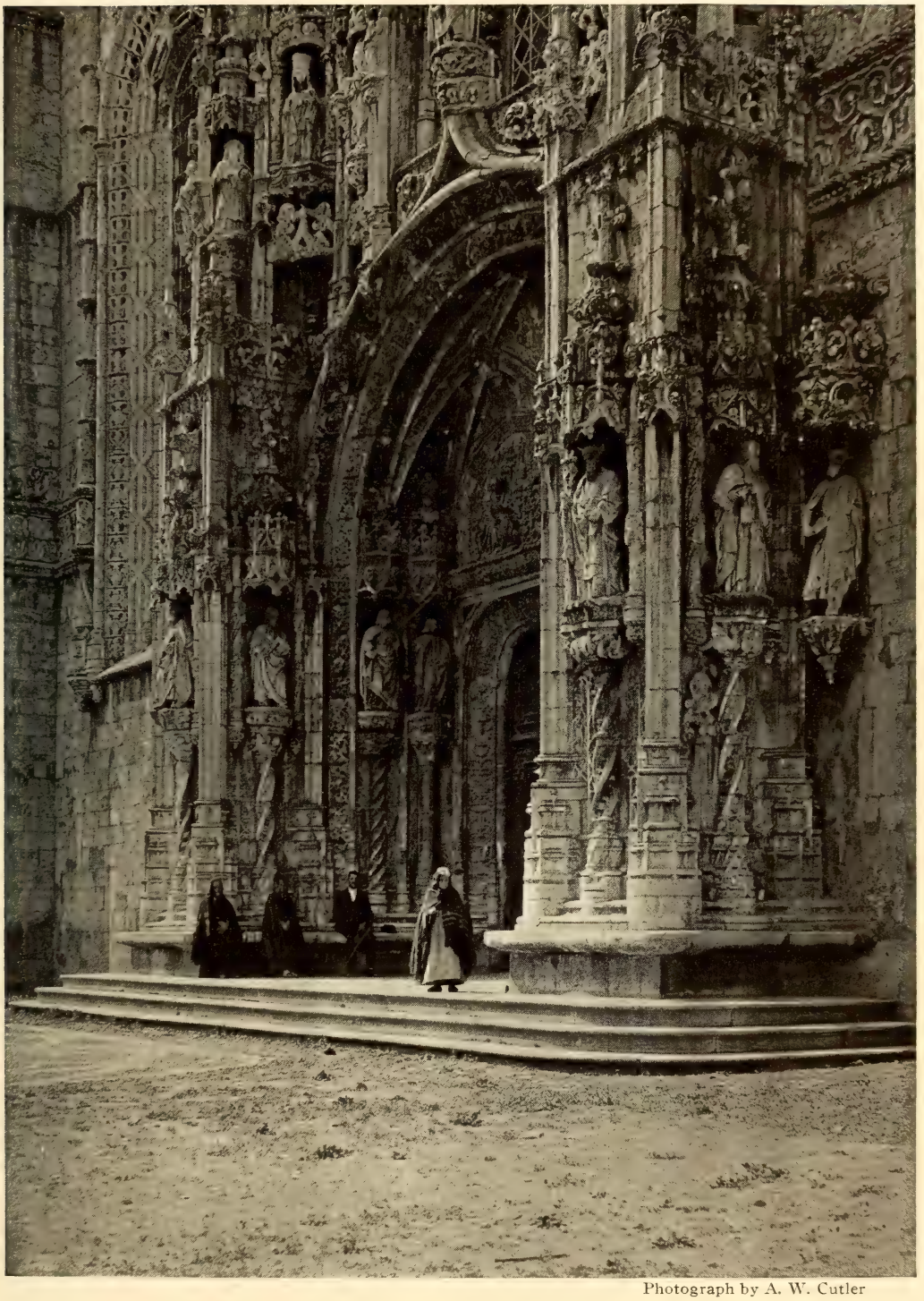
The streets are so narrow that when an "electrico" passes, the dwellers are obliged to stay indoors. Men with red and green bunting are stationed along the tram route, and the traffic is regulated by flag signal.

Steep and crooked, narrow and slippery, with blind turns on every hand, the streets of Alfama are dangerous for automobile traffic. I never have had a more thrilling ride on wheels than that in this section.

Photograph by A. W. Cutler

A DRINKING FOUNTAIN IN THE CLOISTERS OF BELEM CATHEDRAL (JERONYMOS)

Upon the suppression of the convent of Jeronymos in 1834, the buildings were given to the Casa Pia, an orphanage. At least a hundred boys from this institution were standing just back of the camera and were with difficulty restrained from swarming into the picture (see also illustration on page 504).



Photograph by A. W. Cutler

THE MAIN ENTRANCE TO THE CHURCH OF SANTA MARIA

The edifice was founded in 1500, on the site of the hermitage in which Vasco da Gama and his followers prayed on the eve of their departure for India by way of the Cape of Good Hope. The cathedral contains the tombs of many celebrities, including those of Vasco da Gama and Alexandre Herculano, the famous Portuguese historian (see text, page 551).

Photograph by A. W. Cutler

IN THE CLOISTERS OF THE OLD MONASTERY ADJOINING THE CHURCH OF SANTA MARIA (SEE ALSO PAGES 548-551)

This is said to be the finest example of the style of Portuguese architecture developed at the zenith of the nation's power, during the reign of Emmanuel I, and known as "Manueline." It is largely borrowed from the early Renaissance, from the sumptuous buildings of India, and from the Moors.

One could stretch out his arm on either side of the machine and touch the buildings. Here a Roman wall, there a Moorish survival; quaint doorways and ancient grilles, queer slanting roofs and awkward gables—architectural chaos—this section of Lisbon is archeological.

A tramp through the Alcántara district west of the Cidade is like visiting another city. One is forever bumping into churches, parks, cemeteries, convents, palaces, viaducts, barracks, museums, statuary, old houses with delightful balconies, bronze grilles everywhere, wrought-iron grilles in between—a section amazing in color, architecture, and human interest. Most of it suffered terribly from the earthquake; but, strange to state, the churches and convents survived in nearly every instance, as did some of the palaces and other buildings. One should visit the Alcántara by all means when in Lisbon, even if time is a factor.

OTHER BEAUTY SPOTS OF LISBON

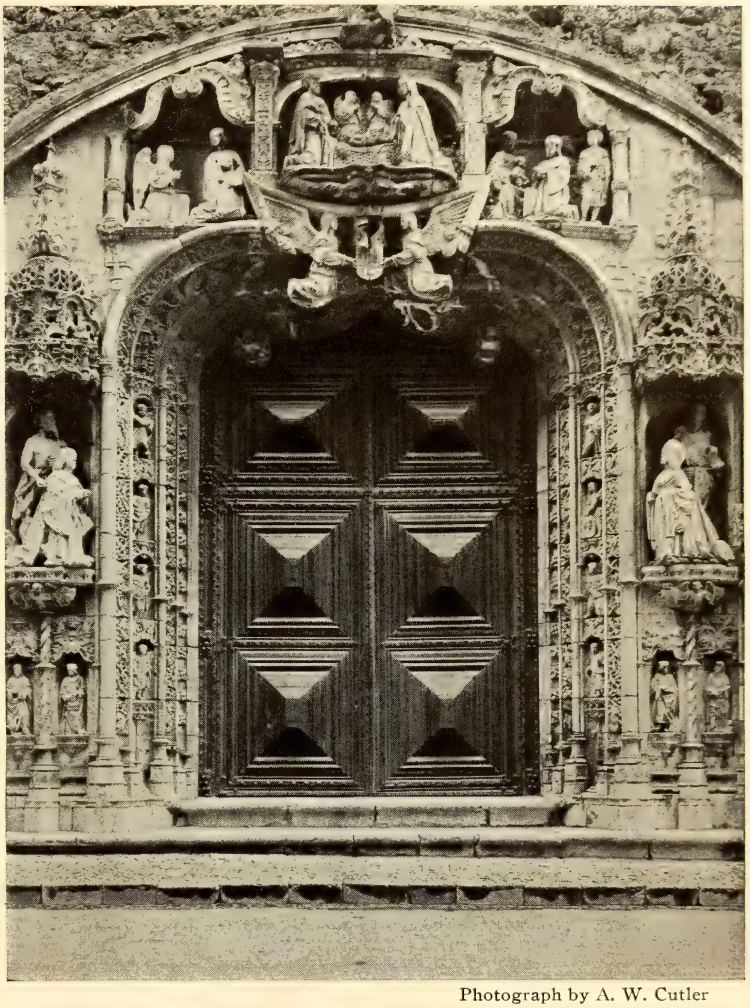
The beauties of the Misericordia Chapel must not be overlooked; it is splashed with silver inside. Then there is the Botanical Garden, the Horticultural Garden, the beauties of the Estrella and its wonderful garden, the British Cemetery with the tomb of Henry Fielding, the great viaduct which brings water 70 miles across the plains, the Palace of the Necessidades with its park, the Cortes Palace, the Ajuda Palace, and the wonderful religious group at Belem.

By far the most beautiful architectural group in Lisbon is that of the Church and Monastery of Santa Maria, locally known as the Jeronymos. Not the least interesting feature of a visit to Belem, where the Jeronymos is located, is the ride by tram from the Praça do Commercio. One passes en route the fish wharves, the electric power station, numerous barracks, squares, palaces, statuary, museums, docks, and all sorts of waterfront activities.

The whole locality is historic ground, bound up with the early discoveries and development of America, Asia, and Africa. From this immediate shore sailed Vasco da Gama Bartholomeu Diaz, Affonso d'Albuquerque, and the conquerors of the Orient.

Henry the Navigator had his chapel and laboratory in a little hermitage near this beach. The return of da Gama from India in 1499 was a triumph for the kingdom, and to immortalize the event, Manuel I erected the superb monastery of St. Jerome on the site of Prince Henry's chapel-hermitage. The locality, previously known as Restello, was then renamed Belem or Bethlehem.

The first stone was laid by the king in the year 1500. From the quarries of Estremadura came the white stone which, after four centuries, even in its most delicate carvings shows no sign of wear or weathering. Built on cedar piling, the edifice has withstood the shock of earthquakes during all these years.



Photograph by A. W. Cutler

THE ENTRANCE TO THE OLD MONASTERY ADJOINING THE CHURCH OF SANTA MARIA

Occupying the site of a seamen's home, this former convent was founded by Henry the Navigator in fulfillment of a vow to erect a convent to the Virgin if Vasco da Gama's enterprise should prove successful.

THE ARCHITECTURAL GEM OF PORTUGAL

The south door of the church is a remarkable example of rich carving in the Manueline style. It is not only ornamental from an architectural viewpoint, but it is a chapter from the history of Portugal carved in stone. The door is divided by a column supporting the effigy of Vasco da Gama. At the right and left are the twelve Apostles, and above the door is the Virgin with twelve saints, while above all and watching over them is the archangel Michael. All these figures are most delicately carved (see page 549).

Inside, the richly carved stone columns splay out into lacy fan vaulting, and several elaborate altars inlaid with silver and gold from Brazil and India give distinction to the plain choir and crossing. An organ of peculiar richness, with its pipes enclosed in wood carving of superb

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LOOKING BACK AT THE TEEMING WATERFRONT OF THE FINEST OLD CITY OF THE IBERIAN PENINSULA

In the foreground is a leg-o'-mutton, yawl-rigged bay fisherman with its miniature longboat tied bow and stern alongside; beyond it may be seen the long, curving spar of a lateen-rigged craft.

design and delicate beauty, is located in a gallery in the west end of the nave.

Buried within this gem-like cathedral are some of the nation's most celebrated dead. In the transept lie Vasco da Gama; Camoens, the great epic poet of Portugal, and Almeida Garrett, 19th-century poet, and in the baptistery rests Joao de Deus, Portugal's greatest teacher.

By a door in the west porch one enters the cloister. This two-story mass of carving has no counterpart in Portugal. Its glory is well-nigh incomparable. Fantastic designs are endless and without duplication in the completed whole, rope mouldings interlace with vines and cusps, a series of pierced quatrefoils adds to the laciness of the arched supports of the balcony story, and vistas of surpassing beauty are seen on every hand (see illustrations, pages 548 and 550).

I sailed down the Tagus at daybreak. Just as the sun came up and bathed the city in a flood of brilliancy, our ship turned down the channel toward the open bay and the ocean. I looked back at the finest old city of the Peninsula, and I kept looking until the ship swung around Cape Raso and sped for the Bay of Biscay, shutting from view behind the mountains that glory-spot of Portugal, and with it the waters of the Friendly Bay.

A SKETCH OF THE GEOGRAPHICAL HISTORY OF ASIA MINOR

By Sir William Ramsay, D. C. L., LL. D.

A glance at the pages of the past will aid the readers of The Geographic *in grasping the significance of the recent upheaval in Asia Minor, especially in the vicinity of Smyrna and along the shores of the Sea of Marmora. The author of the following article is one of the foremost authorities on the geography and the history of the Near East, his knowledge having been gained during a residence of more than 30 years in this part of the world.*—The Editor.

THE great peninsula of Asia Minor protrudes toward the west from the main mass of the continent of Asia and reaches out toward Europe, from which it is divided by the Ægean Sea and by the salt-water river called the Bosporus and the Dardanelles. Until a comparatively recent geologic age, it actually reached Europe, and the Ægean Sea did not exist.

The name Asia Minor is a medieval invention; the ancients used no single name for this large peninsula, which they never regarded as a unity, but only as a congeries of distinct countries—Lydia, Phrygia, Mysia, Cappadocia, Lycaonia, etc. The Turkish name Anadol, Anatolia, is not exactly coextensive, but is a useful variation.

The length from east to west is from 500 to 700 miles, according to the eastern limit chosen by individual inclination. Some extend the name as far as the Euphrates or even beyond; others make the eastern boundary run north from the line of Mt. Amanus (Turkish, Alma-Dagh), which bounds Cilicia on the east. Its breadth north to south varies from 300 to 400 miles (see map, page 554).

THE PENINSULA IS SHAPED LIKE A HAND

In shape the peninsula of Asia Minor may be compared by a rough analogy to the right hand laid palm upward, with the fingers pointing to the west. The palm is the central plateau, which is surrounded with a rim of mountains. Like fingers, five chains of mountains extend from the plateau, most of them stretching far out into the Ægean Sea, as if they were trying to force their way to Europe.

These mountain chains are continued by chains of islands, which form, as it were, stepping-stones for the march of a giant from Asia to Europe. Mt. Ida, which is the western end of the "thumb," is continued by Tenedos, Imbros, and Samothrace. The first mountain-finger, though comparatively insignificant on land, is resumed by the islands of Lesbos, Lemnos, etc. The second finger, Tmolus, is continued by the islands of Chios, Ipsara, Skyros, etc.; and the third, Messogis, by the islands of Samos, Icaria, Tenos, Andros, while the great ridge of Taurus is continued across the sea by the larger islands of Rhodes and Crete.

Each of these chains turns northward and is continued on the European side of the Ægean Sea.

PHYSICAL GEOGRAPHY MADE ASIA MINOR'S PEOPLE SEAFARERS

Accordingly, in Asia Minor, Europe and Asia meet both geographically and historically. But the main mass of the peninsula is Asiatic in character—a continuation of central Asia—monotonous, level, unchanging, but molding man to its own character and imposing a general similarity of type on every race, Asiatic or European, that has settled there.

The west coast, however, is as broken and irregular as European Greece or Scotland. Long arms of the Ægean Sea stretch up into the land, alternating with those long mountain fingers which project far out into the sea.

Very frequently the sea presents by far the shortest way from one point to another on the land; and during a great part of the year it is so quiet, or moved only by winds so regular and certain, that it tempts men to navigation and has tempted them from the beginning of history.

You may stand on a promontory of western Asia Minor and signal by hand across the sea-arm; in fact, in the clear

Drawn by A. H. Bumstead

A MAP OF ASIA MINOR, THE DARDANELLES, AND THE ISLANDS OF THE ÆGEAN SEA

For a more detailed map of this region, see the National Geographic Society's New Map of Europe, issued as a supplement with the NATIONAL GEOGRAPHIC MAGAZINE for February, 1921.

atmosphere you would almost think that the voice could carry over the gulf, as the distance is diminished by the deceptive clearness of the atmosphere; but in order to reach the other side you may have to make a journey of 20 to 60 miles, often very difficult over mountain paths.

Navigation is here forced upon men, or Nature, as it were, tempts men and urges them to cross the easy path of the sea. The people of those Ægean lands drank in the spirit of adventure, and so gradually founded the great series of colonies with which they ringed round almost the entire circuit of the Mediterranean (except where the Phœnicians had established themselves too strongly, from Tripoli through Carthage to the Atlantic Ocean).

That the seaway is the best way is marked even in language, since the word *pontos,* the sea, is commonly explained as a nasalized byform of *patos,* path.

The conditions of life in those sea lands are not too easy. Life is very enjoyable in the clear air and bright sun, but life means work, enterprise, and sometimes danger. A hard-working, self-confident spirit is developed among the inhabitants.

Food is scanty; the land is naturally, in great part, either barren and rocky or in need of great care, foresight, and engineering skill in order to tame it to man's use. Everything encourages the spirit of freedom, boldness and seamanship.

IN LEGENDS THE GODS OF THIS LAND DIED YOUNG

On the other hand, the mass of the Anatolian Peninsula consists of great, gently undulating plains. At the lofty

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CHILDREN OF SMYRNA: A PHOTOGRAPH TAKEN SHORTLY BEFORE THE RECENT HOLOCAUST

elevation of the plateau the winters are long and severe; the summer is hot, but not long. The soil is in large part fertile, but agriculture is dependent entirely on the chances of an uncertain rainfall. The god who gives the "rains and fruitful seasons" to men becomes, in their estimation, a power whose enormous strength emphasizes the insignificance of man and his dependence on nature.

There is a certain melancholy in the tone of the landscape which after a time takes an even stronger hold on the mind of man than the bright and varied scenery of the Ægean coast lands. The religion and the religious legends are characterized by the same tone.

To the Anatolian mind the life of nature seems always to end in early death. In the prime of life and the pride of art the hero-god, who symbolizes and embodies the life of nature, is cut off; he is Lityerses, killed by the sickles of the reapers in the field; or Marsyas, hung up and flayed alive by a hostile power; or Hylas, drawn down by the nymphs into the fountain; or he dies in battle, as Achilles.

ONCE ONE OF THE WEALTHIEST PARTS OF MEDITERRANEAN WORLD

In ancient times this great peninsula of Asia Minor was one of the wealthiest parts of the Mediterranean world; and in particular, the western portion of the peninsula, containing the valleys of the Mæander and other streams which flow toward the Ægean Sea, was renowned as the richest part of the Roman Empire.

It was richer even than Egypt in the Roman period, because the wealth of Egypt belonged to the Emperor himself and did not benefit the inhabitants materially, although they were in a position of comfort and ease and peace; but in the western parts of Asia Minor, which the Romans had classified as the two provinces Asia and Bithynia, the wealth of the country remained more in the hands of the inhabitants, who were free citizens, trading for themselves and making their own profit.

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A VIEW OF SMYRNA BEFORE IT WAS STRICKEN WITH FIRE AND SWORD

Looking east from the mountains over the chief city of Asiatic Turkey.

This prosperity, though maintained by the Roman Empire, was not created by it. It existed long before the Romans had even set foot in the eastern parts of the Mediterranean world; in fact, the entrance of the Romans into Asia Minor during the second century B. C. was for a time injurious to its well-being, for the country fell under military administration.

The Roman governors of Asia were, as a rule, infected with that spirit of covetousness and rapacity which was a marked fault of the Roman character. While often possessing excellent abilities, they were, as a rule, cruel and grasping; yet Asia was able to endure and, after a century, to recover from the rapacity of the military administration.

When the Empire was established by Julius Cæsar, about 46 B. C., and consolidated and regulated by Augustus during his long tenure of power, 31 B. C. to 14 A. D., a new system was established, based on just collection and fair incidence of taxation, and on general administration in the interest of the people of the province.

Under the emperors the well-developed system of interchange of produce and the ease and regularity of communication along the seaways and the land-roads of the Roman world tended to produce an extremely high standard of well-being, and even luxury and wealth, in the Mediterranean world as a whole, and particularly in Asia Minor.

The historian Gibbon remarks that there has probably never been any period when there was such a high standard of comfort and happiness in the world generally as during the second century A. D., "the age of the Antonines."

My purpose is to describe very briefly the originating causes of the prosperity of the country; the greatness of the population and the high standard of wealth which was attained through these various causes; the long process of decay; the possibility of recuperation and renewal of the former happy condition.

IRRIGATION IS ESSENTIAL TO ASIA MINOR'S PRODUCTIVITY

Very few parts of the Mediterranean lands have been given to the use of man by the hand of God in a condition of immediate and easy productiveness; much time and labor have to be expended in bringing them into that condition. That is specially true of Asia Minor.

The low grounds are frequently marshy; there is an oversupply of water.

The great level central plateau is arid; for, although abundant rain falls, it must be stored.

The sloping grounds and hillsides are liable to be swept clear of soil at certain seasons by too abundant rains, which run down and stagnate in the marshes of the low lands. It is necessary, therefore, to conserve and distribute the water-supply.

On the hillsides an elaborate system of terracing is required to retain the rain or the melting snows, and so prevent devastating floods. In the low ground the marshes must be drained and transformed into highly fertile soil.

RELIGIOUS RITES INCLUDED SYSTEM OF ENGINEERING AND AGRICULTURE

These processes involve a large degree of engineering skill. The ancients, who looked to the Divine Power as their guide throughout life, considered Herakles, or a hero-god of similar character bearing a different name in other parts of the Mediterranean world, as the Divine teacher and herald of the rites of the earth-goddess and her religion.

Those rites included a system of engineering, agriculture, horticulture, domestication of animals, and so on, adapted to the various regions of the Mediterranean lands. Among those Mediterranean lands Asia Minor occupies an outstanding position as the best example of growth, development, wealth, and decay.

I give one example of the need for engineering skill, where I might give a hundred.

In 1907 we were making excavations on the slopes and at the foot of the Kara-Dagh in Lycaonia. On the mountain side we observed above the ancient city the traces of a system of terracing which had been almost completely swept away. The terracing was most conspicuous on the banks of a dry course, where water ran down from the mountain side during rain.

In the following year we returned to complete the work. The oval recess in the mountains, where the ancient city lay

Photograph by W. P. Whitlock

A CORNER OF A CARAVAN KHAN OF SMYRNA

Although Smyrna is connected with the Anatolian railway system, much of the commerce with the hinterland is carried on with camels, which file into the city over the Bridge of Caravans. Carpets, tobacco, silk, green acorn cups used in tanning, and the figs which have carried the name of Smyrna to all parts of the world are the chief products of this greatest of Asia Minor cities, now largely in ruins.

surrounded by fields of growing corn, had changed its aspect so completely that we could recognize it only from the position of the mountains and the position of the ruins. The fields of corn were changed to a waste of gravel.

As we began to wander over the waste, we saw that the gravel overlay growing corn, which could be seen in some places struggling through where the gravel was least deep.

An exceptionally heavy rainfall and thunderstorm had occurred not long before our arrival; the rain-water had carried down from the mountain side through the watercourse an immense mass of gravel and disintegrated rock which overwhelmed the fields, and within two hours the entire harvest on which the village depended for food during the ensuing year disappeared.

In older time the numerous terraces would have detained the water from point to point right up the mountain side, preventing it from ever acquiring a volume sufficient to sweep down in a destroying flood. Trees also formerly served to detain the water by their roots.

Now, when the trees and terraces and every means of storage have been destroyed, the rains of spring, instead of being a blessing, are often a curse.

Such a storm as that which wrecked this valley does not occur except, perhaps, once or twice in a century; but the land has been cultivated for many thousands of years, and in that time many such storms have occurred. They can be controlled and made beneficent, or they may be left uncontrolled to devastate the neighborhood.

PEOPLE STIMULATED TO HARD WORK BY NECESSITY

It is not too much to say that the greatest gift of God to the men of the Mediterranean land was a soil that required hard work and scientific skill to make it productive, not a land where food grew with the minimum of labor and care.

The people were stimulated to hard work because this was necessary to life;

Photograph by Cass Arthur Reed

THE CARAVAN BRIDGE ROAD IN SMYRNA

As in modern ports around the world, one sees strange contrasts in Smyrna. The milkman has delivered his milk in the original packages and is driving his flock to pasture. The city is sufficiently occidental to have its sidewalk bootblack, patronized by the man leaning on his cane.

but the work was remunerative and even enjoyable in the clean bracing air of most parts of the country.

They created an excellent system of trade-markets and intercommunication, which implies roads and inter-tribal or international markets, and safety for traders at the markets and on the roads, so that the products of the high ground and the lowlands could be freely interchanged.

The earliest account of western Asia Minor and the Ægean coast lands that has been transmitted to us is contained in the tenth chapter of Genesis.

One of the sons of Japheth was Javan (Greek Ion). The four sons of Javan are those Old-Ionian traders and sailors of Asia Minor who came into relation with the Semitic races during the second millennium B. C., and Genesis records the impression made on the Semites by the "Old-Ionians," who gradually colonized the whole coasts of the peninsula west, south, and north.

In Cilicia, Tarsus and Mallos were rival commercial cities at an extremely early period. Along the coasts great or small Greek colonies occupied every favorable point.

NO ATTEMPT TO FOUND A GREEK EMPIRE

These Greek colonists did not attempt the foolish task of founding an empire; they were content to trade with the people of the country and to make money.

None of these "Greek" colonies were peopled by Greeks alone; they contained a mixed population, whose basis was native, although the guiding spirit and governing genius of each was Greek. The peaceful intercourse of Europe and Asia was then in process.

Exceptions to this peaceful intermixture lay in the tendency of trade to degenerate into piracy, and in the historic events of the siege of Troy, which were wrought first by a school of Asian bards, and then by the supreme genius of one poet, into the Homeric poems.

Those old "Sons of Javan" recognized the true character of their own people: the genius of the Greeks was to penetrate and to vivify the more quiet and even stolid population of the country.

It is impossible to write an account of

this early period of the "Sons of Javan," because it has been recorded only through the coloring medium of Greek tradition and mythology, and little understood by modern historians.

Javan is more of a divine than a human figure. He impersonates the instinct and genius of the Asiatic Greeks, who pushed out in all directions—north, south, east, and west—but always by sea.

Later Greek tradition delighted to picture the Greeks of the west coast of Asia Minor as colonists, who had migrated from European Greece.

This tendency to represent European Greece as the mother country of the entire Greek race constantly reappears in history and lies at the basis of the false modern ideas which describe the Byzantine Empire as Greek, although it was, in the strictest sense, Roman in organization and law and custom and name.

The Old-Ionians were the creative and vivifying element in Asia Minor. They spring ever fresh from the geographic conditions of the west coast, as the other element grows permanently from its conditions; and both are needed to constitute a nation. The most urgent problem presented now in the realm of historical geography is to study the Old-Ionians and the Anatolian Hittites.

GREEK COLONIES GIRDLED THE MEDITERRANEAN

One of the most remarkable facts of history is the power of the Greek people to adapt itself to other nations, and thereby to assimilate nations to itself.

A host of colonies round the coasts of Asia Minor and round the entire coasts of the Black Sea and of the Ægean and the Adriatic and the Italian waters, and the Italian and French and Spanish coasts, and a considerable part of the African coast between the borders of Egypt and the countries of the Carthaginian power, seem to have regarded themselves as Greek.

Greek was the language of education and literature and of higher civilization. Although it was left to Rome to construct a stable organization of unified government and society, we must not forget that great civilizing cities of the west, like Marseille and many others, were founded from Asia Minor, and that the history of Christianity in the first three centuries is largely the story of the influence that originated from the great peninsula, the bridge and pathway of intercourse between Asia and Europe.

It would be a mistake to imagine that the Greeks of Asia were exactly similar to or entirely friendly with the Greeks of the European peninsula. There always tended to be a certain hostility between the populations of neighboring valleys; even in the same valley, city was frequently involved in war against city.

The mother city was sometimes hostile to her colonies, and still more the Greeks of Asia were hostile to the Greeks of Europe.

GREEK ART BLOSSOMED IN ASIA MINOR

It would be an empty task to enumerate the Greek colonies in Asia Minor. They varied at different periods, both in number and in power, some passing away and others founded or refounded, according to the changes in the economic conditions of the country generally.

The essential points in their character have been already noted, and the general principles of Greek life are as true at the present day as they have ever been throughout ancient history. They encircled the entire peninsula and the Black Sea.

It is more to our purpose to notice the great share that these Greek cities of Asia have played in the development of Greek literature and art in every form.

Homer stands supreme in the beginning of the world's literature. His subjects are taken from the history of the "Sons of Javan," and the general opinion in ancient and in modern times is that he was an Asian Greek himself, or that he is the representative of an Asian Greek school of bards.

Lyric poetry is represented by the outstanding names of Sappho and Alcæus and a host of lesser, though still great, names.

The Greek drama, indeed, is almost purely European; but in philosophy many of the greatest old names are Asian, and the first steps in serious speculation about the nature of the world and the work of the Divine power in relation to the world and to man belong to Asia.

The early Greek historians mostly spring

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ONE OF THE FAMOUS SILK LOFTS OF BRUSA

After the silkworms are killed by live steam, the cocoons are carefully dried in lofts for several months before the silk is reeled and prepared for export. The raw silk of this city, noted for its excellent quality, is shipped to Italy and France. From Brusa, at the foot of the Mysian Olympus, a short railway runs to its port, Mudania, on the Sea of Marmora, scene of the armistice conference.

Photograph from Mary Mills Patrick

A GENERAL STORE SOMEWHERE IN ASIA MINOR

This tiny shop, with most of its goods in the front window, which also serves as show-case and doorway, specializes in groceries.

from Asia: Herodotus was the climax and the greatest of the group. Greek music was largely Asian in its origin.

In the realm of art the Ionian artists preceded and gave the example to the Greeks of Greece. The Old-Ionian art had its own character, different in quality from that of European Greece, and the "Sons of Javan" were constructing great temples, adorned with all the wealth of sculpture and color, at an earlier date than the Greeks on the west side of the Ægean.

Such temples as that of Apollo at Miletus, of Diana at Ephesus, and of Kybele at Sardis, originated in an extremely remote period, though in most cases they were rebuilt repeatedly; but every one of the great Ionian cities and colonies had its own wealth of art, sculpture, and painting.

The Old-Ionian school naturally died out; artists of the Athenian school were widely scattered over the Greek world after the brief Empire of Athens in the Greek world came to an end, in 403 B. C., and they exercised a powerful influence on the art of the Ionian Greeks.

Out of this sprang the Pergamenian school and the Rhodian, which have left some of the greatest monuments of Greek art to modern times.

Photograph by Charles E. Beury

A WAYSIDE FOUNTAIN IN KONIA

Konia was once the terminus of the Anatolian railways, whose influence has done much to revive the town. Situated at an altitude of more than 3,000 feet, this present version of ancient Iconium is surrounded by fine orchards and is well watered by hill streams. Konia is about 90 per cent Turkish, but in the days immediately preceding the war had begun to take on some European characteristics.

It is necessary to go to Berlin to see the remarkable remains of the great altar at Pergamos—a structure of extraordinary size and complexity and splendor—and it is necessary to go to the British Museum to see the remains of the Mausoleum at Halicarnassus, the monument and tomb of the Carian prince Mausolus. Those cities and colonies of the "Sons of Javan" were all, from the greatest to the smallest, splendidly adorned.

The best preserved Greek theater was built in the Roman time, at the Pamphylian city of Aspendos.

The sepulchral monuments of Lycia and Phrygia, the rock churches of Cappadocia, are marvelously interesting and beautiful in different ways. Only in Asia Minor can one find the ruins of a city called still by the Moslems the "Thousand and One Churches."

This short list gives no adequate conception of the extraordinary wealth of artistic adornment in those Asiatic-Greek

Photograph by W. P. Whitlock

"SOAKING UP THE SUN"

Throughout Asia Minor, and especially on the high inland plateau, the sunny days and bitterly cold nights form a violent contrast. In the absence of adequate shelter and heating equipment, the people sun themselves before some wall which deflects the wind and reflects the heat, so that for a few hours at least the numbing cold is not felt.

towns. Of the "Seven Wonders of the World," the majority belong to Asiatic and not to European Greece.

THE HISTORY OF THE MYSTERIOUS HITTITES IS YET TO BE WRITTEN

Alongside the "Sons of Javan" there stand the little-known people called the Hittites, whose power confronted the Old-Ionians in their prime, and who were becoming a subject of modern historical investigation in its latest development when the World War interposed serious difficulties in the way of advantageous study.

There can be no doubt that there existed far back, near the beginning of history, in Asia Minor a great central empire, represented by several noteworthy cities and one great capital, situated at Boghaz-Keui, about 100 miles south of the Black Sea, high on the central plateau in northern Cappadocia.

The time, however, has not yet come to write the history of this people. A good deal has been done recently to establish an outline of Hittite history, but it remains only an outline, and mainly a recital of the exploits and monuments of great kings and conquerors, who may for our purpose be classed as the great criminals of history.

The Hittite Empire broke up during the second millennium B. C., just as the Seljuk Empire of Roum or Konia broke up into small principalities during the thirteenth and fourteenth centuries A. D.

The Lydian Empire, with its capital at the splendid city of Sardis, which was in process of excavation on a magnificent scale by an American group of scholars and enthusiasts during the years immediately preceding the World War, was an offshoot of the old Hittite Empire; but it was divided from the main Hittite world by the incursion of the Phrygians, who came in from Europe across the Dardanelles, probably during the tenth century B. C.

It is difficult to give by statistics any conception of the great wealth and the numerous population of Asia Minor in the

Photograph from Near East Relief

SPINNING COTTON AT AN AMERICAN RELIEF CENTER IN ADANA

Raw cotton is a great help to the relief worker, for it not only furnishes material for cheap clothing, but also furnishes a useful job for thousands of widows and young girls. It is no part of American relief to pauperize any one, however needy, and only the aged and the very young receive funds for which they make no return in labor.

Roman period. In the single province of "Asia" alone, to use the Roman name for the western part of the peninsula, which was the richest and the most highly educated of the whole country, there were 230 cities which each struck its own special coinage, under its own name and its own magistrates, each proud of its own individuality and character as a self-governing unit in the great empire.

Many of these cities were large, some were comparatively small, but all possessed their own municipal pride and self-assertiveness.

There was keen competition among them in respect of rank. Three of them claimed the title of "First City of Asia," and vied with one another in boasting on their coinage of the qualities which entitled them to this distinction. One is satisfied with the title "Seventh of Asia," which indicates some recognized order in the assemblies of representatives of the cities which gathered together to practice the religion of the emperors, the state worship forming the bond of unity and of imperial patriotism for the whole country.

But even taking the less developed provinces, where self-government was not such a marked feature, the distinction between a village and a city was not merely one of size; it was based on the development of home rule or local self-government in the township.

Whatever its size, a town ranked only as a village if it had not the right of self-government; but, even though small, a township ranked as a city if it was organized after the Græco-Asiatic fashion, electing its own magistrates and administering its own affairs.

DESOLATION IN A REGION ONCE DENSELY POPULATED

In traversing the most desolate district on the borders of Lycaonia and Cappadocia, where one can now drive for hours without seeing a house or a hut, we have been struck with the fact that we were traversing a country which in Roman time was highly populated and therefore highly cultivated; we were going on from village to village, so close to each other as to form a chain of residence and comfortable habitation at that time.

To take one example of the former wealth and present impoverishment of

Photograph from Mary Mills Patrick

RUINS OF THE GREAT THEATER AT EPHESUS

Famous as the site of the tumult aroused by the mission of St. Paul, the theater at Ephesus is only exceeded in interest by the Temple of Artemis, the "Great Mother" of Anatolia. In front of the theater is the inner harbor, once connected by canal with the Cayster, whose meandering course may be seen to the right.

the country, in 1882 we found a great inscription, erected about 260 A. D., recording 108 subscriptions to a purpose half religious, half patriotic, viz., the rally of paganism to support the Roman emperors in their last great struggle against the rising flood of Christianity.

The subscriptions vary from 6,000 denarii to 500. This monument happens to be complete; but there are many fragments of others similar in character. It is not possible to specify what was the actual monetary value of the denarius at that exact date. Rapid depreciation in its value was proceeding during the third century, and exact knowledge is lacking, but in any case the amount of money involved is very considerable, and this district is at the present time almost entirely lacking in coinage.

We used to find about 1880 that it was extremely difficult to get change for a dollar in any village. At first I suspected intentional reluctance, but I learned that it was largely due to actual want of coined money.

THE ARAB INVASIONS BEGIN

There remains little space for the two concluding topics. The prosperity of a country such as we have described, just as it was created by work guided by scientific knowledge, could be maintained only so long as there existed in the country a sufficiently high standard of social and economic attainment to keep in order the basis on which that prosperity rested.

Watchfulness, care, and knowledge were required to repair any fault which developed in the irrigation works and prevent any dislocation in trade.

During the third century A. D., when the Roman Empire was going to pieces, Asia Minor was exposed to frequent inroads of barbarian tribes from Central Asia, and there was for centuries almost continuous war with the Sassanian monarchs of Persia and Mesopotamia.

Thereafter arose the still greater menace of the fiery Arab inroads. The Moslem armies were knocking at the gates of Constantinople only a few years after Mohammed had fled a hunted fugitive from Mecca, and almost every year between 660 and 965 A. D., bands of Arab raiders or even great armies crossed the Taurus and ranged over Asia Minor.

Almost every city of the country was captured at least once by the raiders; yet the immense strength of the highly organized Roman society prevailed in the long run.

There arose from time to time some great emperor, such as Heraclius, about 600, who in a wonderful series of campaigns broke the Sassanian power and marched at will through Mesopotamia and Persia and Armenia, or Nicephorus Phocas, who finally ejected the Arabs about 965; and these emperors rebuilt the empire again and again.

Although the Roman civilization survived in Asia Minor, it was dislocated and out of repair.

GREAT HIGHWAY WRECKED TO STOP INVADERS

The great highway through the Cilician Gates, which was a necessary line of communication and trade, had been wrecked completely during those long wars. Byzantine troops destroyed it to prevent the Arabs from entering the Roman territory, and the Arabs naturally did nothing to repair the damage.

The road system generally was broken up, and very few remnants of the old Roman roadways can now be seen. The lines of road can be traced by the milestones, but the structure has usually disappeared.

The Roman social system had not been destroyed to the same degree. The Arab raids were too hurried. Moreover, there was in western Asia the old religious law of war, that the invader might destroy the annual crops and produce scarcity and famine, but he must not destroy the trees, the olives and the vines, on which the prosperity rested in so large a degree.

Annual crops can be resown next year, but trees require many years before they begin to reward the labor bestowed upon them.

It was left to the Crusaders, under the command of German and Norman and Frankish nobles and bishops, to inaugurate the era of the total destruction of a country by cutting down the trees.

Sometimes this was done as an urgent war measure. For example, during the siege of Jerusalem by the warriors of the First Crusade, in 1100, almost all the olive trees around Jerusalem were cut

Photograph from Mary Mills Patrick

A STREET OF POTTERY SHOPS IN AN ASIA MINOR TOWN

As in Damascus, there is a street or section of the towns in Asia Minor devoted to each kind of merchandise. The fez, or tarbouche of the city dweller, the wide Turkish trousers of the peasants and caravaneers, the white turban of the religious man, and the gay-colored scarves, which are worn as belts, here distinguish various Asia Minor types.

Photograph by Katherine W. Stewart

THE HISTORIC HARBOR OF RHODES

To-day an outpost of Italy off the southwest coast of Asia Minor, Rhodes was formerly the base of a navy whose fame still lives. It was also the site of one of the Seven Wonders of the Ancient World—the Colossus, a statue of Helios more than a hundred feet high, which was overthrown by an earthquake in 224 B. C. and sold to a junk dealer nearly nine centuries later.

down in order to form siege machinery. It was only in the latest development of "civilized" warfare that the plan was adopted of deliberately cutting down all trees in order to destroy the prosperity of a foreign country.

Asia Minor enjoyed a period of recuperation after 965. The boundaries of the Roman Empire were extended farther to the east than ever before. The cultivator of the soil could enjoy security of tenure and look forward with confidence to reaping the fruits of his toil. He could repair the watercourses and the supporting walls of the terraces on the hillside.

THE TURKS ARRIVED IN 1070

But a greater danger supervened when the Turks entered Asia Minor in 1070. With them and behind them came wandering tribes from central Asia, who are called by the Byzantine historians Nomades or Tourkomannoi.

These broke the strength of an organized society by reducing a great part of the country from the agricultural to the nomadic stage. The supply of food diminished accordingly, and with the waning food-supply the population necessarily decreased.

A decreasing population in its turn was unable to supply the labor necessary to maintain the old standard of water engineering, on which prosperity rested. Gradually industries languished and died in the towns as well as agriculture in the country.

The sultans did what they could. Neither the Seljuk Turks nor the Ottoman Turks were actuated by religious fanaticism. They wished to preserve the old social system in so far as it was consistent with the dominance of a conquering caste; but they could not maintain the education which was necessary in the old Roman organization.

Moreover, the ruinous method of massacre was resorted to sometimes in order to prevent any dangerous development among the subordinate races. This has been carried to a hitherto-unknown extreme during the last thirty years, and reprisals have not been unknown when opportunity offered.

Thus the whole basis of prosperity was wrecked, not by intention, but by steady decay. A number of causes coöperated and each cause intensified the others.

Can the prosperity of this derelict land be restored? That is largely a question of politics and is excluded from discussion here; but one may say that for a long time it has been the game of all the surrounding countries to prevent the restoration of prosperity in Turkey.

This policy has often been carried out with the minimum of regard for the interests of the oppressed nationalities by their so-called friends.

There is required, for the actual recuperation of the land, knowledge to guide labor. The schools and colleges established by the American missions were achieving a great work until the World War began. Among the numberless legacies of evil that have remained has been the interference with this work of training the country.

Advisers are required, and technical trainers, in order to restore the ancient methods of conserving the water-supply or substituting better methods.

Agriculture will be developed slowly and it will take a long time to put many parts of the country into cultivable condition.

There are minerals as well as many other forms of wealth which the country tenders to the use of man. Copper and lead were once mined, and the silver mines of Bulghar Maden had been worked continuously from the Hittite period until quite recent times.

Copper was worked at Arghana and at a place 20 miles north of Konia, but has been exhausted. Yet there are large deposits of minerals still to be worked, especially in the Taurus region.

Gold was formerly extracted in Lydia and in Mysia.

These and many other minerals, such as chromium, can be or have been worked successfully under good management; and they would provide what is one of the greatest needs of the country—work for men who in times of peace are extremely eager to work, but who rarely find anything to do by which they can earn a dollar a week.

Meanwhile the restoration of agriculture is the indispensable basis of the country's prosperity.

THE NATIONAL GEOGRAPHIC MAGAZINE

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"THE GLORY THAT WAS GREECE"

By Alexander Wilbourne Weddell

Formerly American Consul General at Athens

AFTER some six years spent in Greece, after learning to love that land of "cloudless climes and starry skies" with something of the affection which I feel for my own country, I am fain to try to convey to those who may read these pages some of the enthusiasm and interest and affection for that soil which life there kindles.

In attempting this I am following a well-worn path, for the compelling charm of Hellas has been the theme of poets, philosophers, artists, historians, and travelers from the earliest days. Foremost among travelers must be named Pausanias, the Baedeker of the second century after Christ, whose minute work is a basis on which our archeologists commence to build to their sometimes startling conclusions. Since his time, save for that long period following the reign of Justinian at Constantinople, when a veil seems drawn over the Balkan Peninsula, through which invasions, internecine strife, massacres, and cruelties are dimly felt and seen, there have not lacked men of the stamp of Pausanias to penetrate the country and leave their impressions.

In those days such voyages required strength, fortitude, and courage of the highest order. How different, how very different, from the luxury now surrounding a voyage to Greece!

APPROACHING ATTICA BY SEA

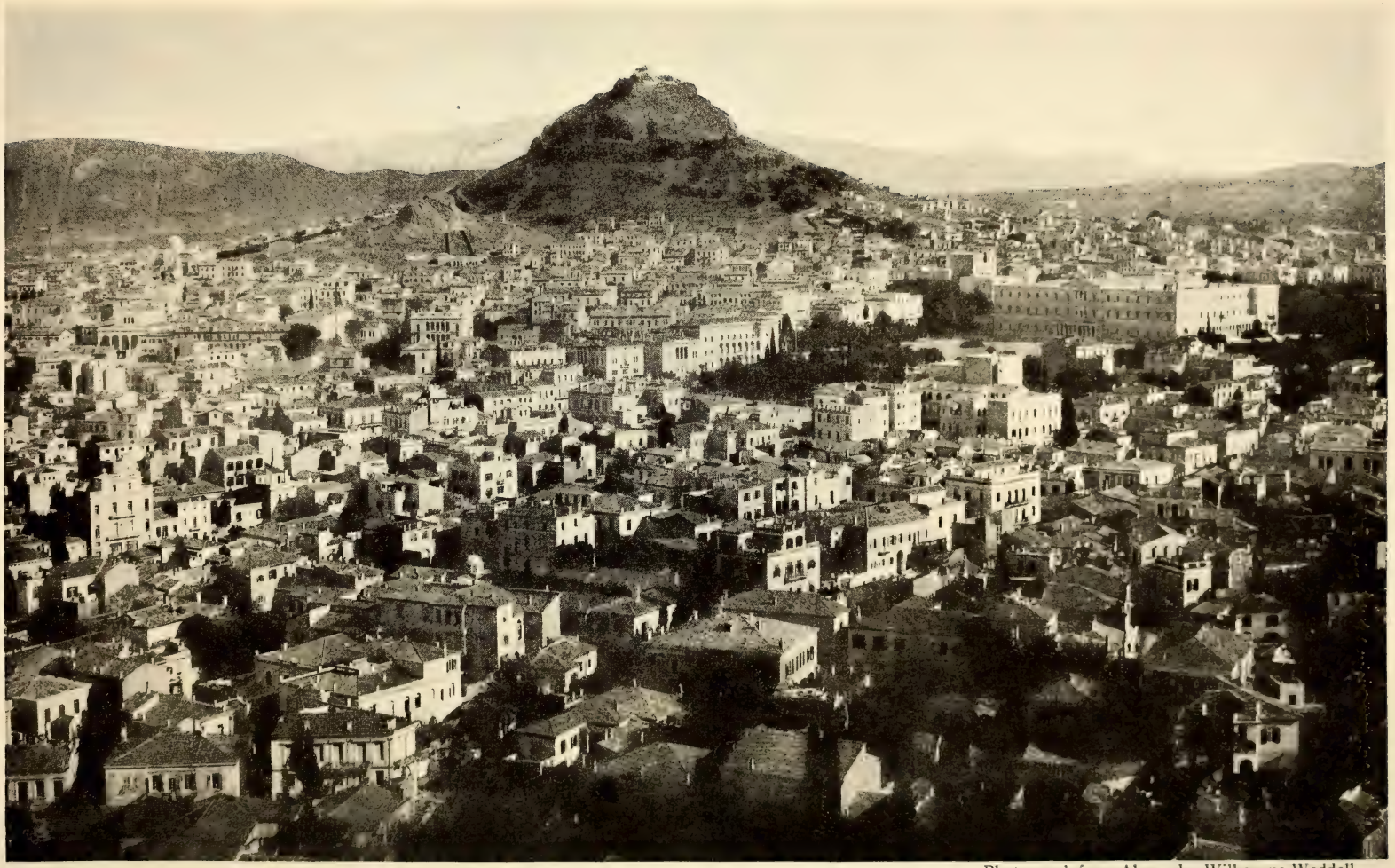
Fate, working through my Government, decided me to go by water. Three days over summer seas from Sicily, three nights under starry skies, a fairy glimpse of Cerigo,—the Cythera of the poets, near to which Venus rose from the sea—then a long line of low-lying islands echeloned toward the coast, and there lay before my eyes the Plain of Attica, surrounded by hills, with "Athens, the eye of Greece," as its center (see map, page 574).

To every one sensitive to historical suggestion, to every one to whom beauty makes the supreme appeal, the first sight of this immortal city becomes the moment of a lifetime.

To the right rose Hymettus, famed now, as in ancient days, for the honey which the bees rifle from its flowers; to the left, and nearer, the island of Salamis, with its deathless memories; a bowshot away, Psyttalia, where Aristides and his band cut down the flower of Persian chivalry, after the naval battle of Salamis; still farther to the left, the ranges of Parnes, extending in a full, voluptuous curve toward the east.

Sweeping this panorama with powerful glasses, the city revealed itself more clearly, wearing "like a garment the beauty of the morning," and, outtopping all, the Acropolis, with the Parthenon as its diadem.

In its still beauty, its majesty and its tenderness, the scene had a vague unreality. I thought of the spirit hand "clothed in white samite, mystic, wonderful," which rose from the lake in the poet's vision and sank again.



Photograph from Alexander Wilbourne Weddell

A VIEW OF ATHENS FROM THE ACROPOLIS

Facing in an easterly direction, the hill of Lykabettos is directly in front, crowned by a little chapel dedicated to St. George—a saint who is to-day held in high repute in Greece. In the distance is seen Mount Pentelikon, from which came the marble used in the construction of the buildings on the Acropolis.

Photograph from Alexander Wilbourne Weddell

THE RUINS OF THE TEMPLE OF OLYMPIAN ZEUS

The present ruins date from the age of Hadrian. Legend says that this is the place where the last water of the Deluge disappeared, the first sanctuary having been erected here by the grateful Deukalion. The columns now standing are of exquisite beauty, and the golden brown color lent to them by time adds to their charm. On the last column in the group lived a long line of pillar hermits, or "stylites" (see text, page 577). The last of these died about 1860.

Drawn by A. H. Bumstead

A MAP OF SOUTHERN GREECE—THE ATTIC PLAIN AND THE PELOPONNESUS

The area of Attica (the ancient division of Greece comprising the territory of Athens), together with the island of Salamis, which belonged to it, was hardly more than 700 square miles. Its population in its flourishing time was probably about 500,000, of which nearly four-fifths were slaves.

Thackeray, a tourist of the 40's, calls the hills around Athens "aristocratic" and defends the use of the term; it seems the one word capable of describing the grace and noble reserve of these heights.

Few people have said such charming things of hills as the satirist in speaking of these; amid much that displeased him, *their* appeal was irresistible. "Round this wide, yellow, barren plain," he says, "there rises, as it were, a sort of chorus of the most beautiful mountains—the most elegant, gracious, and noble the eye ever looked upon. These hills did not appear at all lofty or terrible, but superbly rich and aristocratic."

Later he tells us how "the hills rise in perfect harmony, and fall in the most exquisite cadences." This was the panorama unfolded to my eyes.

Often, in later days, on these encircling hillsides I have sensed the deep violet which they wear at eventide as something so close and so palpable that it seemed it could be felt on hand and cheek like moisture borne by a southern breeze.

THE HARBOR OF PIRÆUS, SEAPORT OF MODERN ATHENS

It is a ride of only 20 minutes by electric railway from Piræus to the Greek capital. In ancient times the port was connected with Athens by the celebrated Long Walls.

It is a tiny country we are about to enter. The Attic plain stretches from the sea in an irregular oval from south to north; the entire province contains a bare 700 square miles.

Yet Attica "balances in the universe the glory of Imperial Rome." "Remember well, Quintius," writes Cicero to his friend, "that you have command over the Greeks, who have civilized all peoples, in teaching them gentleness and humanity, and to whom Rome owes the light she possesses." Cicero, of course, meant Attica, for it was in this little country that what we call the Greek genius was most effectively at work in the fifth century before our era.

SPARTA AND ATHENS COMPARED

Chateaubriand, spurring his horse along the Sacred Way from Eleusis, through the defile of Daphne, over a road which had felt the footsteps of the Three Hundred marching to glorious death at Thermopylæ, which had shaken to the tread of Sulla's legions in a later day, which had quivered as Attila and his rude hosts advanced with barbaric shouts toward Athens, drew rein to muse over the wonder and the loveliness here revealed to him:

"Sparta and Athens have kept even in their ruins their different characters; those of the former are sad, serious, and solitary; those of the second are laughing, light, and inhabited. On viewing the country of Lycurgus all one's thoughts became serious, masculine, profound; the soul is fortified and seems to put on a glory and expand; before the city of Solon one is as enchanted by the prestige of genius; one is possessed by the idea of the perfection of man, considered as a rational and immortal being.

"Love of country and liberty was not for the Athenians a blind instinct, but an enlightened sentiment, founded on this taste for the beautiful in all its manifestations with which Heaven had so liberally endowed them; in fine, in passing from the ruins of Sparta to those of Athens I felt that I would have wished to die with Leonidas and to live with Pericles."

Photograph by W. P. Whitlock

THE PORCH OF THE MAIDENS (SEE PAGE 593)

The figure just above the American girl is a copy placed there to fill the space made vacant by Lord Elgin when he took one of the maidens to the British Museum.

Landing at Piræus is not more disagreeable than at any other Mediterranean port. There is the same confusion, the same noisy boatmen, the same ineffective harbor police, equally powerless with those in Spain and Italy to control their turbulent compatriots. Piræus was once famous for the high standard of its municipal government; but this was long ago, and it is now as dirty and unattractive a port as one can find in the Mediterranean.

Attracted by the name "Themistocles," which one of the leather-lunged boatmen gave as his own, my friend and I surrendered ourselves to his mercy, and through the noise and tumult finally reached the shore. Customs formalities disposed of, we stowed ourselves on an electric train which took us in 20 minutes to Athens.

This electric railway deserves a special word of praise. It is one of the best things in modern Greece,* well equipped and well run. Formerly travelers arriving at Piræus had a disagreeable drive over the six miles which separate the port from the capital. The victims, in language more or less blasphemous, have given their opinion of the Greek road, the Greek coachmen, the Greek horses, and the Greek road-houses, which the trip fixed indelibly on their minds. Hence this bouquet thrown at random!

At Athens we found accommodation in a hotel which was once the home of the French Archeological School. From the balconies we looked down on Constitution Square, the heart of the city, and had a superb view toward the Acropolis and toward Hymettus.

The latter was just changing the dusty garment worn through the glaring day and over her shoulders was slipping a robe of deep violet of exquisite shade and quality; the sun was dropping behind Salamis; long shadows crept up the valleys and into the depths of the friendly hills; a star, which must have been Venus, trembled over the still waters of the Saronic Gulf; from the King's Garden, less

*For accounts of modern Greece, see in the NATIONAL GEOGRAPHIC MAGAZINE for October, 1915, "Greece of To-day," and for February, 1921, "The Whirlpool of the Balkans," by George Higgins Moses.

than a hundred yards away, came the voices of nightingales.

This was my introduction to Athens.

THE FIRST WALK THROUGH THE CITY

My friend and I had determined that we would scorn the tribes of Baedeker and Joanne and not be inveigled into an ordered, exact trip to the lovely sights and scenes to which we looked forward; so it was perhaps 10 o'clock, after a breakfast of delicious fruit, with coffee and crisp toast and Hymettus honey, in which latter we each fancied we could detect the vague fragrance of favorite flowers, that we set forth on our thrilling voyage of discovery.

Straight away from the hotel runs a broad avenue named after the wife of King Otho—Amalia. Down this we wandered slowly, leaving the Royal Palace on the left and skirting the King's Garden.

Beyond a distant glimpse of the Acropolis, the first classic monument our eyes rested on was the Arch of Hadrian. This Emperor, it will be recalled, was one of the principal benefactors of Athens in the value and character of his gifts. These embraced a water-supply, a reservoir which is in use to-day, a library, and perhaps the Temple to Olympian Zeus. He also built the new city beyond the old one, and the Arch at which we looked marked the dividing line between the Greek and Roman towns (see illustration, page 592).

We passed through the Arch and, turning to the right, entered the precincts of the Temple of Zeus. The temple, like the buildings on the Acropolis, is of Pentelic marble, to which time has given an exquisite golden brown color, especially on the side which faces the sea. Two of the columns stand detached like sentinels and by a happy accident close the three-mile tangent formed by the Syngros Avenue, which links up modern Athens with its little seaside resort, Phaleron.

Photograph from Alexander Wilbourne Weddell

STELE OF HEGESO IN THE CEMETERY OF THE CERAMEICUS

This is, perhaps, the most beautiful of all the gravestones in the ancient cemetery. It dates from the fourth century B. C. and represents a noble lady at her toilet, attended by a female slave. As in so many of the Greek sculptures, the draperies are worthy of special study (see page 602) .

We took a seat on the base of one of the columns and looked up to its top. There, during a series of years, a long line of hermits had passed their nights and days until death brought them release (see illustration, page 573).

During my stay at Athens I was assured by an old Athenian that he remembered as a child visiting the precincts of the temple and carrying gifts of bread and fruit to

Photograph from Alexander Wilbourne Weddell

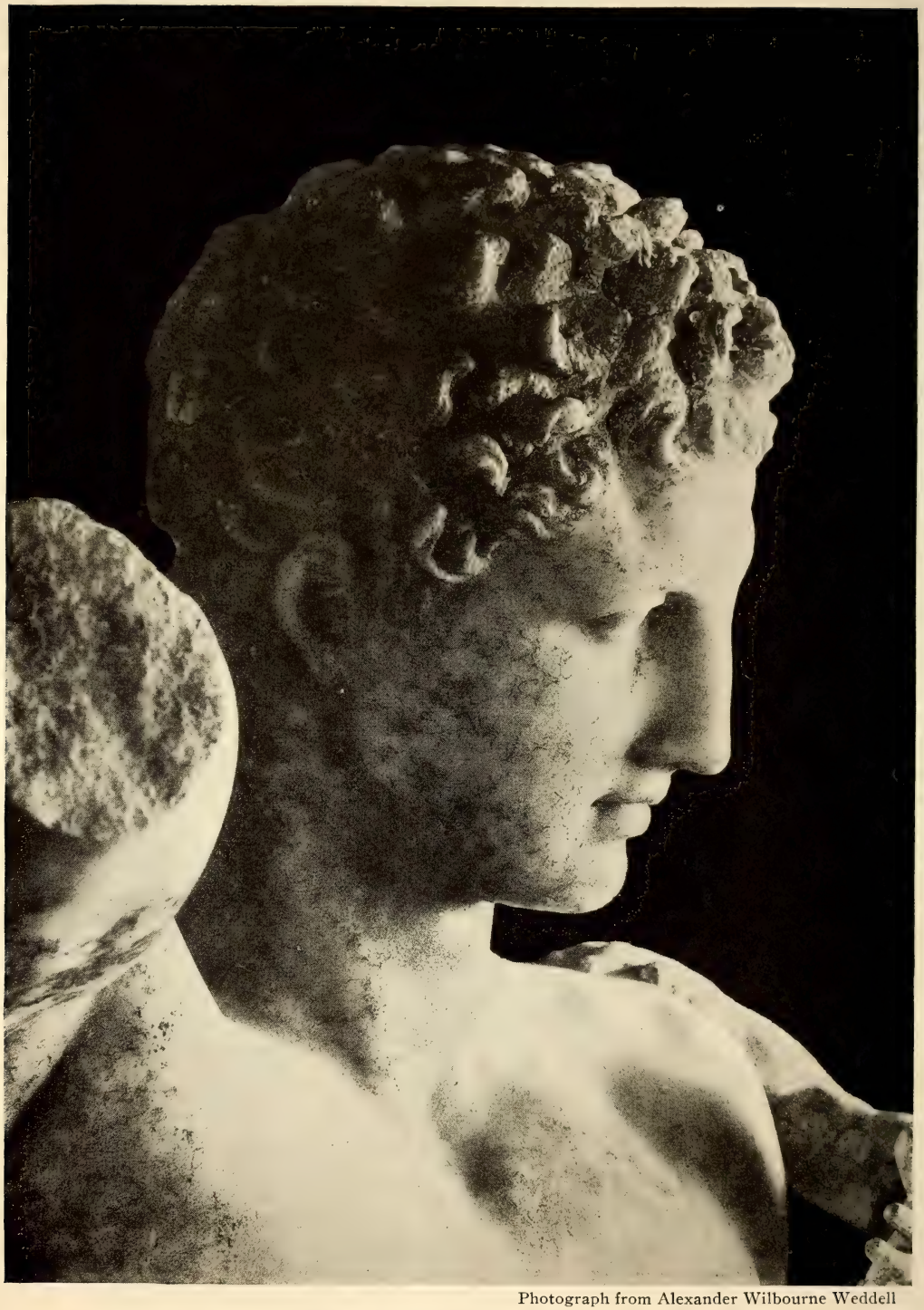
THE CEMETERY OF THE CERAMEICUS (SEE PAGE 597)

Just outside the city gates, this Street of Tombs led to the garden called the Academy on the banks of the Illissus—the favorite haunt of Plato. In the distance is seen the Acropolis, with the Parthenon and the Erechtheum. To the right, but invisible in the picture, lie olive groves. In such surroundings one thinks of Shelley's reference to the grave of Keats—"It might make one in love with death, to think that one should be buried in so sweet a place."

Photograph from Alexander Wilbourne Weddell

WHERE THE ANCIENT COURT OF THE AREOPAGUS SAT (SEE TEXT, PAGE 597)

The court is said to derive its name from the fact that Ares (the Mars of the Greeks) was the first person tried here. Popular tradition also assigns this as the spot from which St. Paul, in the spring of A. D. 54, delivered a sermon of which we have an account in the seventeenth chapter of Acts. In the distance is the Parnes Range, while on the right, and immediately below, is the Theseion, one of the most perfectly preserved monuments of ancient times.



Photograph from Alexander Wilbourne Weddell

THE HERMES OF PRAXITELES

This matchless marble, discovered at Olympia in 1877, is considered by many critics the finest example of Praxitelean sculpture extant. It is interesting to recall that while our modern art lovers pay hundreds of thousands of dollars for masterpieces on canvas, the people of Cnidus once refused to sell a statue of Aphrodite by Praxiteles to King Nicomedes, although that monarch offered in exchange to cancel the whole debt of the city, which was enormous.

Photograph from Alexander Wilbourne Weddell

VICTORY FASTENING HER SANDAL

This exquisite fragment was one of a number of reliefs representing Victory, forming a balustrade around the Temple of Athena Nike, or Nike Apteros. Even to the unskilled eye, this fragment is a feast of beauty in the marvelous delineation of the curves of the body and the masterly treatment of the draperies. It probably dates from the fourth century B. C. (see text, page 591).

the stylite who then dwelt on the column and who would let down a basket to receive the offerings of visitors.

ATHENS HONORED VICTORS IN CONTESTS OF THE ARTS

We retraced our steps through the Arch of Hadrian by a narrow street known as the Street of Lysicrates and which is probably the site of the ancient Street of the Tripods.

In the age of Pericles, apart from the athletic contests which took place at the Olympic and other games, there were contests in Oratory, in Poetry, and in Music. At Athens the victor in one of these games was given a brass tripod, with the privilege of erecting a pedestal on which to place it, somewhere in the city.

At the end of the little street down which we walked stands, in almost pristine loveliness, perhaps the only surviving monument of this character. It is the exquisite little structure—the oldest extant—erected by an Athenian, Lysicrates, on which to place the tripod awarded him as the organizer of a choir of young men which won a prize in vocal music in one of the games in the fourth century B. C.

This little structure was built into a convent in medieval times and was thus preserved from destruction. The convent was standing in Byron's day and he was a guest there in 1811; it was not until some years later that the monument was restored at the expense of the French Government.

IN THE THEATER OF DIONYSUS

It is but a stone's throw from the Monument of Lysicrates to the Theater of Dionysus, or Bacchus, to give it its Roman name (see pages 597 and 598).

Like most Greek theaters, the tiers of seats are built into the hillside, while its arrangement is such that the spectators viewing the actors had in the distance the sea; so that as Tragedy, "in scepter'd pall, came sweeping by," there was ever present to the eye an expanse of land and water to heighten the effect produced by the action of the play.

And what names this place calls up—Æschylus, Sophocles, Euripides, Aristophanes—the long roll of the great ones of Greece!

It is related of Socrates that once, when he was being lampooned and burlesqued in this theater, he rose gravely from his seat and stood for a little space, until the audience could make a comparison between the original and the copy.

The theater of to-day is Roman; the site only is from the earliest period. It will be recalled that the Romans introduced the stage in the modern sense; the Greek actors wore a high-laced boot with a thick sole, called a cothurnus, to raise them above the chorus.

THE FRAGMENTS OF THE EXQUISITE TEMPLE OF WINGLESS VICTORY

Leaving the theater, we walked slowly to our goal, passing on the right the precincts of Æsculapius and various remains, including the charming Odeion built by Herod of Attica, another Roman benefactor, of the second century A. D., on to the iron gates which mark the lower precincts of the Acropolis. Passing through these and walking up the long incline, we came to a turning on the right and saw before us the gates, or Propylæa, of the Acropolis.

High up on the right was the little Temple of the Wingless Victory, while a corner of the Parthenon could be descried over the retaining wall. My impatience was such that I broke into a run, bounding up the steep stairway which leads from the outer gate of the Propylæa to the upper level, and arrived panting on the platform on which is the Victory Temple.

Here we stood and drank in the marvelous view, and then, turning, ran our eyes caressingly over the shrine. Nothing can exceed in delicacy and charm this exquisite little structure. Four Ionic columns, each some thirteen feet in height, support the architrave, but so perfect are their proportions that it is only when standing beside them that one realizes that they are twice the height of a tall man.

This diminutive, yet perfect, edifice was demolished by the Turks in order to build a bastion, and was later reconstructed with the fragments of the original building.

A pleasing tradition which dies hard was that Victory had so constantly perched on the Athenian banner that she had lost her pinions and had come permanently to reside at Athens. However, learned and cruel men have shown that

Photograph by Fred Boissonnas

THE WESTERN PORTICO OF THE PARTHENON

Even in ruins the great temple of Athena Parthenos, crowning the Acropolis, is the chief glory of Greece. It was erected during the rule of Pericles under the direct superintendence of Phidias, greatest of sculptors. Phidias himself made the colossal ivory and gold statue of the divinity which was inclosed within the magnificent shrine and dedicated in 438 B. C.

Photograph by Fred Boissonnas

THE VIEW OF THE ACROPOLIS FROM THE NORTHWEST

Athens, "the eye of Greece, mother of arts and eloquence," is built around the rock of the Acropolis, which rises to a height of 180 feet above the Plain of Attica and is about 1,100 feet long and 500 feet broad. On it stand the ruins of the Parthenon, the Erechtheum, and the temples of the Wingless Victory and of Artemis.

Photograph by Fred Boissonnas

A THESSALIAN PEASANT WAGON AT THE FOOT OF MOUNT OLYMPUS

Thessaly is a fertile plain of northern Greece entirely surrounded by mountains, broken only by the Vale of Tempe, which separates Ossa from Olympus. The peasant with the pitchfork is wearing the native costume.

Photograph from Alexander Wilbourne Weddell

A VIEW TOWARD THE STAGE IN THE TEMPLE OF DIONYSUS: ATHENS (SEE PAGE 582)

It was not until the time of the Romans that a higher speaking place or stage, in the modern sense of the word, was provided for the actors. They were first distinguished from the chorus by their greater height, gained by wearing a buskin or high shoe, called cothurnus. The reliefs supporting the stage are from the time of Nero. The scenes depicted are from the Dionysiac myth. On the extreme right the sitting figure, badly mutilated, is that of Dionysus. The crouching figure of Silenus belongs to an earlier period.

Photograph by Fred Boissonnas

ON THE WATERS OF THE GULF OF ARGOSTOLI

This arm of the sea runs deep into the island of Cephalonia, one of the largest and most fertile of the Ionian Isles. The island is noted for its currants and its inhabitants are among the finest sailors of a seafaring nation.

Photograph from Alexander Wilbourne Weddell

THE RUINS OF THE TEMPLE OF APOLLO AT DELPHI

Unlike most pagan structures in Greece, the Temple of Apollo at Delphi would seem never to have been converted into a Christian church. In the vestibule of the ancient temple were carved the famous sayings of the seven sages, "Know thyself" and "Nothing too much." In one corner of the building was the chasm of the Oracle, a cleft in the earth from which a poisonous gas arose (see text, page 630).

Photograph by Fred Boissonnas

A GREEK MONK AND HIS WIFE BEFORE THE CONVENT OF ST. GEORGE: PHENEOS

This convent, at the foot of Mount Krathis, in the Peloponnesus, once stood a mile from its present site, but was forced back by the waters of Lake Pheneos in the 18th century. In ancient times Pheneos was the seat of a temple to Artemis Heurippa, said to have been founded by Ulysses because he discovered his lost horses here. Not far away is the Stymphalian Lake (Saraka), abode of the man-eating birds destroyed by Hercules as his fifth labor.

THE CORINTH CANAL, "A SWORD-CUT IN THE BROWN EARTH SHORTENING THE JOURNEY FROM THE ADRIATIC TO PIRÆUS BY 200 MILES"

Twelve years were required to complete the canal, which is four miles long, 75 feet broad, and 26 feet deep, its construction representing a cost of sixty million francs. It connects the Gulf of Corinth with the Saronic Gulf (see page 623).

the Wingless Victory is really one of the manifestations of Athena.

Near by is the spot from which the aged King Ægeus took his stand to catch the first beam glittering on the sail of the returning ship in which his son Theseus had sailed to Crete to kill the Minotaur.

The rest of this heroic legend is familiar to all—of the beautiful youths and maidens destined to be devoured by the monster; of Theseus, their preserver, who penetrated into the Labyrinth and found his way out by means of a silken thread given him by Ariadne, torn from her allegiance by her love for the handsome stranger; of how it had been agreed between Theseus and his father that on returning to Athens white sails would be hoisted in place of the black ones to indicate his triumph over the monster; of how, in the flush of victory, the young man forgot this, and the old father, seeing the black sails and believing his son to be dead, threw himself headlong from the rock.

The king's name is given to the Ægean Sea, which a poetic fancy would have lapping on the crags at the foot of the promontory.

VICTORY TYING HER SANDALS, A MASTERPIECE IN MARBLE

Around the bastion-like space in former days was a balustrade adorned on the outer side with reliefs in marble representing Victory in various attitudes. Several of these have been preserved, notably the Victory tying her sandal.

This work, dating from the fourth century B. C., at a moment when Greek art was first manifesting a decline from the austere quality of the preceding century, is certainly one of the loveliest fragments that have come down to us from antiquity.

The model was, perhaps, a young Greek girl of about fourteen years of age; the naked body was doubtless drenched with water, and then over it was thrown a filmy garment which molded itself to the fair young form; the artist then endeavored to express the vision in unyielding marble (see illustration, page 581).

In this beautiful work the delicate curves of the body, the soft revealing of the budding bosom under the gossamer-like garment, the softly rounded arm, whose delicacy of form is vaguely suggested by the fold of drapery around it, the eternal and radiant youth which animates the fair figure, all combine to give to it a quality of rarest loveliness and charm.

It was an effort to leave this spot, but one had the feeling that the great moment was yet to come.

IN THE SHADOW OF THE PARTHENON

We walked back a few yards through the upper colonnade of the Propylæa and before us stood the Parthenon in all its overwhelming grandeur and severe beauty.

There are things in this world which we so love or so admire that we are loath to praise them, lest by clumsy or ill-chosen eulogy we should harm or diminish what we are fain to honor. I felt this before the Parthenon.

Standing there, it was a pleasure to recall that this monument, the epitome of classic Greek art, like that example of a later Greek art, St. Sophia at Constantinople, was really a glorification of the Divine Wisdom; for he must be a dull fellow who fails to see some such idea in the lovely myth of Athena springing, full grown, fully panoplied, and with a shout, from the brain of Jove; as for St. Sophia, the name is derived from the Greek, meaning Holy Wisdom.

We stepped into the warm sunshine and walked slowly toward the temple. There were poppies blowing around our feet, and from below came familiar city noises, softened by the distance. At several points artists had set up their easels and were making more or less successful attempts to reproduce some of the beauty of the place and hour.

THE VIEW FROM THE PARTHENON

We climbed the steep steps and entered the building, and here were fortunate in meeting an archeological acquaintance who pointed out those things about the building which make a special appeal to the lay mind.

In the Treasure House, at the west end, we were told, had been stored the booty taken at Salamis, which included Xerxes' throne.

In another spot various Christian bishops had slept through long centuries. Just here it was recalled to us that the

Photograph from Alexander Wilbourne Weddell

THE ARCH OF HADRIAN

This arch formerly divided the ancient Greek city from the new Athens of Hadrian. The three window-like openings were once filled with thin slabs of marble. Through the archway are seen the ruins of the Temple of Olympian Zeus, which also dates from the time of Hadrian (second century A. D.).

Parthenon really served as a Christian church longer than as a pagan temple, and from it prayers have gone up to Jove, to the Saviour, and to Allah.

The portico commands a superb view of the Saronic Gulf; at every turn names familiar as household words came to our lips—Salamis, the Bay of Eleusis, the dome-like rock of Acrocorinth, Ægina, and in the distance the soft line of hills marking the Peloponnesus.

Our archeological friend, whom I had thought as hardened as a hangman to all about him, was so much moved that he took from his clenched teeth the pipe which seemed to have grown there and, becoming loquacious, observed that in considering Greek structures it should not be forgotten that the *inlook* was as beautiful as the *outlook*—that the Acropolis, Acrocorinth, Sunium are, perhaps, as beautiful to look at as to look from.

Photograph by Lewis W. Hine

A CHANCE MEETING ON THE STEPS OF THE PARTHENON

The American sailor and soldier here pictured are both Greeks who spent most of their lives in America before meeting on the Acropolis, in the city of their birth.

"And this," he continued, waxing warm, "is in marked contrast to that later manifestation of genius that we call Gothic. Though there may be exquisite views from the pinnacles yet, how rare is it that your Gothic structure has such a setting as to bring out its true beauty, when seen from afar."

BEFORE THE PORCH OF THE MAIDENS

We finally turned and began looking at the Porch of the Maidens—the Caryatids. These are too familiar to every one to require any description and elaboration, but, as with other Greek sculptures, are admired whole-heartedly. The perfection of the draperies, the radiant youth animating the figures, the dressing of the hair, massed to give added strength to the neck, are a few of the elements of loveliness. Despite the latter device, however, in later times, as will be seen by examining the illustration on page 576, it has been necessary to make a sort of iron frame in which to support the weight of the roof.

A dozen paces from the Erechtheum,

Photograph from Alexander Wilbourne Weddell

THE MONUMENT OF THRASYLLOS

The grotto seen in the foreground is mentioned by Pausanias; it is now a Greek chapel. The monument was destroyed by the Turks when they fired their artillery against the Acropolis in 1827. The two columns above the grotto supported votive tripods, the holes in which they were inserted being still visible at the top. The walls are those built by Cimon, son of the great Miltiades, the victor at Marathon.

Photograph from Alexander Wilbourne Weddell

THE TOWER OF THE WINDS

This octagonal structure dates from the first century B. C. Above the doorway is Skiron, with a vase, and immediately to the right is Zephyr, represented as a youth shaking flowers from the folds of his garments. The tower at one time served as the town clock of Athens, for inside was installed an elaborate clepsydra, the water being brought from a spring on the side of the Acropolis.

Photograph from Alexander Wilbourne Weddell

THE MARKET GATE AT ATHENS

This gate was erected by the Athenians about the beginning of our era with funds given by Julius Cæsar and Augustus. Through the arch can be seen a tablet erected in the time of Hadrian, relating to the market prices of salt, oil, etc. One is amazed to think of prices so unvarying that they could be graven in everlasting marble; a second thought is that even under Roman administration the public had to be protected against profiteers! The gateway was formerly crowned by a monument to Lucius Cæsar, who was adopted by Augustus and died in the year two of our era.

Photograph from Alexander Wilbourne Weddell

ROWS OF CHAIRS IN THE THEATER OF DIONYSUS

The theater accommodated about 16,000 spectators. In the foremost row were marble chairs, the one in the center being reserved for the priest of Dionysus. Other chairs bear inscriptions denoting their use by priests or other dignitaries. The two blocks of marble on the third tier of seats probably supported the throne of the Emperor Hadrian. Throughout the theater were statues of the tragic and comic poets, the most prominent being the bronze figures of Æschylus, Sophocles, and Euripides.

whose portico stands to-day in almost untarnished beauty, are the walls built by Themistocles after the destruction of the first temple by the Persians in 480 B. C. In it were used a number of the drums of the ancient columns.

WHERE ST. PAUL PREACHED OF "THE UNKNOWN GOD"

Looking down from these walls, there lay immediately below us a little hill which was pointed out as the Areopagus, or Hill of Mars. Physically, the place has little of interest. There is a short flight of steps cut in the rock, and at the top are the sites of ancient altars (see p. 579).

The ancient Court of the Areopagus, consisting of venerable and eminent Athenian citizens, held its sittings on this hill, and it is usually assumed that it was from here that St. Paul, the future captive of Imperial Rome, in A. D. 54 spoke to Athenian skeptics, with a reference to an altar "To the Unknown God."

"The flesh warreth against the spirit," whispered my friend in my ear; then, a moment later, "*I'm* going to luncheon." So we retraced our steps at a quickened pace and in a few minutes were back into the 20th century and French cooking.

WHERE PERICLES DELIVERED HIS ORATION ON THE UNKNOWN SOLDIER

Our afternoon was given to the Cemetery of the Cerameicus. The Cerameicus was the name of a suburb lying to the northwest of ancient Athens. This was inhabited, as its name indicates, by the potters (see illustration, page 578).

Visitors to Rome and to Pompeii are

Photograph from Alexander Wilbourne Weddell

THE THEATER OF DIONYSUS (SEE PAGE 582)

Below the Acropolis lay the temple inclosures of the Wine God. Within this space the masterpieces of Æschylus, Sophocles, Euripides, and Aristophanes were first performed. Many changes have taken place in the original structure and the fragments we now see date, perhaps, from about the third century A. D. On the left, in the distance, is seen the monument of Philopappos, crowning the hill of the same name.

Photograph from Alexander Wilbourne Weddell

AN INSIDE VIEW OF THE STADIUM WHERE THE FIRST OF THE MODERN OLYMPIC GAMES WERE HELD

The stadium at Athens is on the site of the original structure where were held the Pan-Athenian games. It was originally laid out by the great Lycurgus, one of the "ten" Attic orators. The present stadium is really merely a resheathing of the old structure in Pentelic marble. A Corinthian propylæum of a temporary nature now forms the entrance. In the background is seen Mount Hymettus. The new work was inaugurated with the Olympic games of 1906 (see text, page 607).

Photograph from Alexander Wilbourne Weddell

THE PLAIN OF MARATHON, SCENE OF THE GREAT CONFLICT BETWEEN EAST AND WEST

The water in the distance is the Gulf of Marathon. Beyond is the island of Eubœa. To the extreme left, and in the soft curve of the shore, the Persian galleys were drawn up. Down the valley, from near where we stand, swept the Greeks. Toward the right, and at a short distance from the shore, rises the Mound under which lie buried the Athenians who fell in the battle. The cypress trees in the foreground are a characteristic feature of Greek landscapes (see page 607).

Photograph from Alexander Wilbourne Weddell

THE MOUND OF MARATHON

This pile of earth, 40 feet high, probably marks the spot where the struggle between the Greeks and the Persians was hottest (see text, page 607). Herodotus was the first to write an account of the battle, some 40 years after the event, and he records the interesting fact that the Athenians were the first of the Greeks to introduce the custom of engaging the enemy at a run.

familiar with the custom obtaining in ancient days of burying the dead immediately outside the town gates and by the side of the highroad. The Cerameicus is really a street of tombs and it is the only ancient cemetery now extant in Greece.

It will be recalled that it was here that Pericles delivered his famous oration over those Athenians who were killed in the first year of the Peloponnesian War. His ringing phrases come down to us through the ages with that freshness and beauty and strength which seem to characterize all that was best and greatest in ancient Greece.

Lowell says in one of his essays that he was the last of the great readers. I think most of us are haunted by regrets over the books we can never read or reread, but I know of nothing that will more richly repay the reader than that chapter of Thucydides in which he sets forth Pericles' words to the bereaved families gathered around him in this spot. In it he draws a comparison between Sparta and Athens which, with a fine prevision, seems intended to describe the France and Germany of our time.

Among the Greeks special honor was done to the memory of a soldier when his body was allowed to lie where he fell. To those of lesser glory was reserved sepulture at home, amid familiar sounds and scenes. It is difficult to write what has been said above without recalling the lines of the soldier-poet, Rupert Brooke, whose body lies buried on the little Greek island of Skyros—a piece of ground "that is forever England."

There are few more touching things than some of the old-time memorials still standing in this cemetery. Among these are steles erected at the public cost to two ambassadors of Corcyra who died at Athens in the fourth century B. C.

Some of the family groups are of a simple, homely character; in one of these is sculptured a mastiff; near by, and perhaps the most beautiful of all, is a patrician lady at her toilet, taking from a casket held by a female slave some article of personal adornment (see page 577). Exquisite pitchers in marble, of the shape in which water was brought for the marriage bath, marked the grave of Athenian maidens "untimely lost."

From the cemetery in ancient days led a long road to the garden called the Academy; it owes its name to the hero Academus. Here Plato loved to wander.

There is a ridiculous little railway linking Athens with a small country town to the north called Kephisia, famous from classic times for its gushing streams and fountains and for its coolness, even in the midst of an Attic summer. The railway, which was committed in recent years by a Greek company, wanders along in an irregular fashion for some miles; one of the stations between Athens and Kephisia is a point of departure for the climb to the summit of Mount Pentelikon, from which there is a view of the entire Attic plain as well as the field of Marathon.

Leaving the railway at this station, our path led us by a gentle incline through olive groves and patches of pine forest to the very foot of the mountain.

WHERE "THE MOUNTAINS LOOK ON MARATHON"

Here for perhaps a half hour we climbed slowly over an ancient causeway leading to one of the quarries whence in ancient days marble had been taken for the building of Athens. At several points we saw huge drums of marble, ready to be let down the causeway, where they had been left by workmen who "downed tools" more than twenty centuries ago.

As we went higher, the plain revealed itself in all its loveliness. The Saronic Gulf glittered like a silver shield under the warm sun; Salamis, Ægina, Poros, and Hydra seemed but a little distance away; to the north the symmetrical form of the mountains of Eubœa swam into view. A short, rough scramble up a barren slope and we were at the top.

"The mountains look on Marathon and Marathon looks on the sea," sings Byron in one of his most deeply inspired chants. We have our first glimpse of the plain from this summit, 4,000 feet above the blue waters of the Eubœan Sea.

In the far distance the soft outlines of the hills of Eubœa are silhouetted against the azure sky. From the valley there mounted to our ears the "mellow lin-lan-lone of far-off bells"; in our nostrils was the scent of wild thyme. Immediately below were other ancient quarries from

Photograph by Fred Boissonnas

THE CONVENT OF DAPHNÉ ON THE SACRED WAY (SEE PAGE 617)

Near the pass in the low hill that lies between Athens and the blue bay of Eleusis to the northwest is this old convent, eight centuries old and fallen into decay, which links the architecture of Byzantium with the Attic environment. Inside are some fine old Byzantine mosaics and from the altar screen hang votive offerings from those who have found relief from their afflictions.

Photograph from Alexander Wilbourne Weddell

RUINS OF THE GATEWAY TO THE SACRED PRECINCTS AT ELEUSIS (SEE PAGE 618)

The fragments that we see are doubtless those of the gateway erected by Hadrian. The Goths, under Alaric, were probably the destroyers.

Photograph from Alexander Wilbourne Weddell

THE TEMPLE OF DEMETER AT ELEUSIS, WITH THE ISLAND OF SALAMIS IN THE BACKGROUND

In the near-by plain man, according to Greek tradition, first practiced the art of husbandry under the tutelage of the goddess (see text, page 617). Only the initiated were allowed to take part in these solemn mysteries. A conspicuous feature of the festival was the solemn torchlight procession that left Athens and passed along the Sacred Way. The temple stood until the close of the fourth century A. D., when it was destroyed by the Goths.

Photograph from Alexander Wilbourne Weddell

THE TEMPLE OF POSEIDON AT SUNIUM

Sunium is the name of a rocky headland rising 200 feet above the sea, some fifty miles from Athens. From the earliest times the place was considered sacred. The ruins are those of a temple built about the fifth century B. C. On one of the columns Byron carved his name (see text, page 620).

which in former days the dazzling marble had been hewn to be carried to Athens, there to grow into forms of beauty under the chisel of a Phidias or a Praxiteles.

The scramble down the hillside was an hour's labor and it was another two hours before we reached the Mound of Marathon, raised over the graves of those Athenians who were slain in the conflict.

ON THE FIELD OF MARATHON

The Mound rises perhaps 50 feet above the surrounding plain and is crowned by low bushes (see page 601). Its slopes are covered with grass, while encircling it is an irregular hedge of cacti. From the top there is a view of the entire plain.

One is tempted to smile at the handful of men engaged and the small space covered, yet it is a sobering thing to let one's imagination dwell on what would have happened to the world had the barbarians triumphed in this conflict.

I am sometimes tempted to sympathize with an acquaintance who bewailed the defeat of Montcalm at Quebec and Napoleon at Waterloo. But here, under the Grecian sky, greater issues were involved. It was the first Titanic struggle between East and West, and had the result been different, our religion, our speech, our laws, the very framework of the society which, with all its defects, we hold dear, would have been radically changed, and who would dare say for the better?

THE TRAGIC INCIDENT THAT ENDED GREEK BRIGANDAGE

In the early 70's the road from Athens to Marathon was the scene of a horrible tragedy, when Greek brigands attacked a party of excursionists from Athens, most of them connected with various foreign legations in Greece, and held them for ransom. The women and children of the party were released, and one of the men, Lord Muncaster, who died only about two years ago, was dispatched to Athens to raise the sum demanded.

After Lord Muncaster's arrival at the capital, and following the acceptance of the terms laid down by the brigands, the latter changed these and insisted on more favorable conditions. In these circumstances Lord Muncaster, after consulting with his Minister and other friends, felt that he was not in honor bound to give himself up again. He accordingly remained in Athens.

Meanwhile, negotiations were being carried on with the banditti. Unfortunately, at the same time Greek troops attempted to surround the brigands. The latter fled and, being hard pressed, cut the throats of all their prisoners.

The scandal had now become international, and various powers made vigorous representations to the Greek Government. Finally a number of the criminals were captured and executed and others given long terms of imprisonment. This shocking case may be said to have marked the end of brigandage in Greece.

THE MODERN STADIUM ON AN ANCIENT SITE

The route covered by the Runner at Marathon, in his mad flight to bring the good news of victory to Athens, lay between Mounts Pentelikon and Hymettus and was about 24 miles long. In 1906 approximately the same distance was covered by the runner in the Olympic contest of that year.

This messenger of ancient days doubtless finished his course in the Marketplace, falling lifeless there, as he uttered the simple phrase, "We have won"; the goal of the modern athlete was the magnificent stadium which now covers the site of the ancient structure (see page 599).

As is the case with other stadia, and particularly all Greek theaters, the stadium at Athens, under the plans of the great Lycurgus, was made by cutting into the hillside. While this involved the removal of great quantities of earth, it solved in some measure the problem of walls. The acoustics were in many instances of extraordinary quality.

Athens owes the stadium of to-day to the generosity of a wealthy Greek of Alexandria; it really represents a resheathing of the old structure, and this marble covering is from the same veins as those from which the material for the classic monuments in Athens was hewn.

The stadium is in the form of an ellipse. Near the center, on the right, are seats for the members of the royal family, government authorities, and foreign representatives. At the end of the ellipse are places for the judges. Near by are set up two ancient Hermæ found in excavating.

Photograph from Alexander Wilbourne Weddell

THE GYMNASIUM FROM THE TEMPLE OF APOLLO AT DELPHI

Delphi was the center of the cult of Apollo. The grandeur of the scenery, the ice-cold springs, the mysterious air currents from the gorges, from earliest times filled the passer-by with awe. In ancient days the speech of the Oracle had far-reaching effects, and the cult of the god did not cease until the close of the fourth century of our era, when the Byzantine Emperor Theodoric put an end to it by the sword. We are looking down from the temple of the god to the Gymnasium, set in the midst of olive trees. The bathing pool is plainly visible.

About 60,000 people can be accommodated in entire comfort in the inclosure. However, there is but one exit—through the open portion of the ellipse—in which respect it differs from our "bowls" and stadia. But what is lost in the Athenian stadium from the practical standpoint is more than compensated for by the gain in beauty through the absence of the disfiguring passages seen in the modern American structures.

In the reign of Hadrian wild-beast hunts took place frequently in the stadium, and it is thought that the rock-like tunnel on the left-hand side, opposite the entrance, was used to introduce the animals into the arena. In 1906 the athletes made use of this tunnel.

PELOPONNESIAN PEASANTS IN NAUPLIA, CHIEF TOWN OF ARGOLIS

Beautifully situated on the gulf of the same name, Nauplia is, for modern Greece, an unusually clean town. It was captured from the Turks by the Greeks just 100 years ago (December 12, 1822) and for 11 years was the Greek capital.

Greece is the country *par excellence* for picnics. It is a common saying in Athens, that "there is not a day in the year in which the sun is not visible for at least a moment." However this may be, one is generally assured of good weather for excursions, and when one adds to this the softness of the air, the beauty of the landscape, and the wealth of association, there is little left to be desired.

Another charm which the rambler in Attica is quick to remark is the absence of human life, even within an hour's walk of the capital. I have wandered over the hillsides for an entire day and have not seen even a shepherd boy.

One of the most delightful of the many trips out of Athens is to the Fortress of Phyle, which lies hidden away in the Parnes Range and guards what was once an important route, especially toward Thebes. It is true that there were other routes into the Bœotian Plain, but that via Phyle was of great importance. Over

A WATER-BOY OF ATHENS

this road came Byron and his friend Hobhouse, and it was the view from here that inspired the poet to write the familiar "Spirit of Freedom! When on Phyle's brow."

For the general traveler Phyle has a special interest, recalling its association with Thrasybulus. Toward the close of the Peloponnesian War, when the Athenians had been overthrown by the Spartans and a government favorable to the Lyconians established — "the "Thirty Tyrants"—Thrasybulus established himself here with a few comrades and, gradually strengthening his little band, finally was able to deliver Athens from the hated yoke of the Xenophile oligarchy.

An interesting feature of the fortress is that the gateway was so arranged in conformity with the local topography that assailants were obliged to approach it with the right side exposed. Thus an attacking force would be under the necessity either to wear their shields on their right shoulders for protection, and thus be powerless to throw stones or javelins, or else to lay themselves open to similar attacks from the besieged.

The fortress frowns on Attica and could only be held for long by a garrison

ON A MOUNTAIN ROAD IN THE PELOPONNESUS

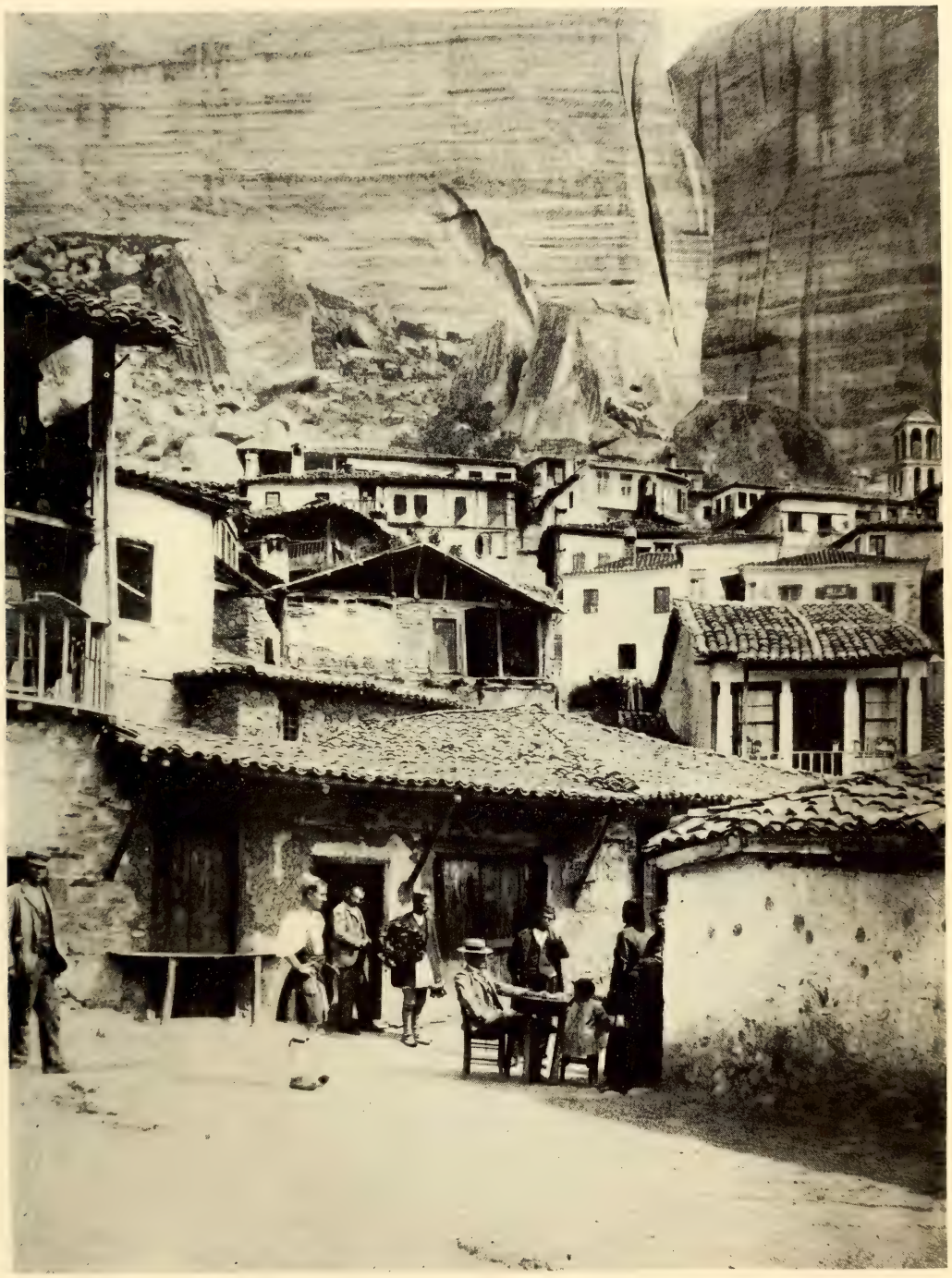
Photograph by Fred Boissonnas

A ROADSIDE INN ON THE ROAD FROM TRIPOLIS TO SPARTA

Between Tripolis, the most important town in Arcadia, and Sparta, once the rival of Athens, the modern road is little used. Tripolis, which occupies the sites of three earlier cities, is only a hundred years old, but is one of the most important towns of the Peloponnesus. Sparta, less than half the size of its modern rival, is also a new town on an old site and was founded after the Greek War of Independence by King Otho.

A STYLITE MONASTERY PERCHED ABOVE KALABAKA

Although the monks of Meteora held a far different doctrine from Simeon Stylites, they also sought a pillar-like retreat above the clamor of worldly affairs. At one time there were twenty-three rich convents in this section of Greece, but to-day there are only seven, of which the one here pictured and several others are uninhabited.



KALABAKA, AT THE FOOT OF THE PILLAR ROCKS OF METEORA

This strange village occupies an elevated slope where the Peneios, the largest river of Greece, enters the plain of Thessaly. Just to the north are the Khassia Mountains, which more than once during the troubled history of Greece have formed the boundary that now lies much farther north.

Photograph by Fred Boissonnas

THE MAN MOTOR OF A THESSALIAN ELEVATOR

The monks who dwell in the convents of Meteora are raised one at a time to their lofty abodes in nets or rope bags, which are hoisted by means of crude capstans (see also illustration on page 612). The ascent takes about three minutes.

that commanded the mountain district to the north. Its massive walls of cleverly joined masonry, with one circular and several square towers, which are still in a fair state of preservation, inclose a small oval platform which on three sides ends in precipitous slopes. Near the fort is the spring from which the garrison drew its water.

A VISIT TO ONE OF THE CAVES OF PAN

Two hours beyond Phyle is one of the numerous caves dedicated to Pan. The path is over a rocky slope between high cliffs and through a patch of pine forest to a deep gorge. Here begins what was in ancient days the rude pathway leading to the foot of the ravine. At a number of points the ground is giving way and it is a matter of no small difficulty to reach the bottom.

Once in the rocky bed of the torrent which fills this, the cave is seen a little way up on the further side. A short scramble and one reaches a small platform before the mouth of the grotto.

Apart from its picturesque surroundings, the cave has but little of interest to offer. There is a spring of limestone water of icy coldness and the soft earth which is banked against the walls sometimes offers a treasure in the way of a terra cotta lamp to those who have the patience to dig there.

The way home is by a solitary, difficult road, which leads to a picturesquely situated Greek monastery, called "Our Lady of the Defile." From the terrace of the monastery is a fine view down the gorge. Towering high above it is a lofty cliff, plainly visible from Athens and which, because of its chariot-like shape, is called "Harma."

Greek monasteries are true hospices and are required by law to entertain the traveler. However, these legal requirements would seem to be quite unnecessary, to judge from the writer's experience. The Greek monk seems a gentle and kindly type. Of the spontaneity of his hospitality and the cordiality of his reception there can be no doubt.

Photograph by Fred Boissonnas

IN THE BELL TOWER OF THE MOST IMPORTANT MONASTERY IN GREECE

The Convent of Megaspelæon, near the rack-and-pinion railway, which runs south from the Gulf of Corinth up the valley of the tiny Erasinos River, is situated in a vaulted cave. There are now only about 140 monks and the income has shrunk to a mere fraction of its former two million francs a year. The monks do not, as in many other convents, hold all their property in common, but each has his own revenue from lands and houses, some of which formerly were in Smyrna and Constantinople.

Photograph by Fred Boissonnas

GREEK PARISH PRIESTS WITH THEIR FAMILIES

The papas, or parish priest of Greece, is often so poor that he is forced to doff the long black gown and black skull-cap or high black hat and eke out his ecclesiastical income at some secular task. His wife, or papadia, aids him in his agricultural labors.

The coffee at the monastery of "Our Lady of the Defile" was often a poor thing and the bread at times incredibly bad, but the *mastika,* a mild Greek liqueur for which I at first conceived a violent prejudice "from recollections of early childhood" (it smells exactly like paregoric), was always of the very best quality.

On leaving the monastery the abbot and two of the lay brothers walked with us to the beginning of the road, which falls sharply to the valley, while one of the younger brothers brought a small bouquet of flowers plucked on the hillside near by.

We reached the village of Khasia, from which our ascent had begun, just as the soft twilight was stealing over hill and valley. Across the plain the lights of Kephisia began to twinkle; sheep-dogs were baying in the distance; there was a vague sound of far-off bells, and softly as the dew the stars crept into the quiet skies.

About fourteen miles from Athens lies the city of Eleusis, on the bay of the same name. Directly facing it, across the blue waters, is the island of Salamis.

ALONG THE SACRED WAY

From Athens to Eleusis leads a broad road, the "Sacred Way," which vies with the Appian Way in its claim to historical interest. The route from Athens is across a dusty plain, inadequately watered by the Cephissus, a part of which is outlined by olive groves. In these groves the philosophers loved to walk, and to-day they are the haunt of care-free children and young lovers, who have perhaps found a wisdom surpassing that of those gray beards of far-off days.

It is said that Tennyson loved water above all the elements and would go miles to see a gushing fountain; it is certain that a sojourn in Attica, where such a sight is rare, makes one linger by a stream. The love of old Greek philosophers and poets for streams and fountains is due in large measure to this lack.

Leaving the stream and the olive groves,

Photograph by Fred Boissonnas

AT THE VILLAGE FOUNTAIN IN THE MOUNTAINS OF PELOPONNESUS

the road begins to rise gently; we are passing through the lower ranges of the Parnes and a few minutes brings us to the 12th century convent of Daphne, evidently built on the site of a shrine once dedicated to Apollo. Back of the convent and away from the road is a forest of pine and fir affording a grateful shade, where we stopped for our luncheon (see illustration, page 603).

The convent of Daphne is in the very heart of the Sacred Way; at many points by the roadside may be seen parts of the original roadway cut in the living rock.

Near the end of the pass are the ruins of a temple of Aphrodite, with niches for votive offerings.

As we passed we noticed that in two of the niches flowers had been placed—by some pagan Greek, let us suppose, or say by some sophisticated modern, pretending to pagan influence, with his tongue in his cheek.

TREADING IN THE PATH OF THERMOPYLÆ'S HEROES

This is sacred soil we are treading; the path we press has known the footprints of the Three Hundred marching toward their rendezvous with Death at Thermopylæ, while in later centuries Roman legions and Huns and Vandals have made the encircling rocks echo to their shouts.

From the earliest times this road was the natural route to the Peloponnesus, leading over the Isthmus and on to Corinth and beyond.

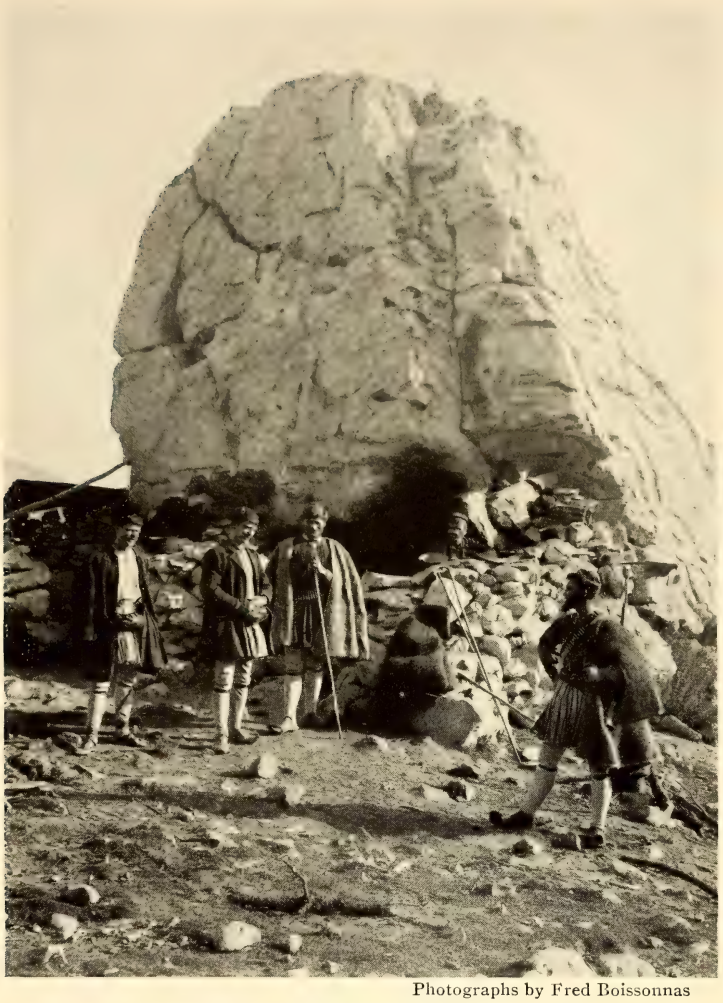
AT THE SHRINE OF HUSBANDRY

A turn in the road brought the bay into view. A soft wind blew from the gates of the sun and seemed to bear to us some of the lovely color of the water; overhead there was a Maxfield Parrish sky, and underneath the brown soil of a parched land.

Coming to the water's edge, we stopped and dipped our hands into the blue and tried to fancy ourselves as pilgrims to the shrine, or else candidates for at least the Lesser Mysteries.

Resuming our march, we went slowly on, skirting the bay all the way to the town.

In the plain through which we passed, man, according to the Greek tradition, first practiced the art of husbandry, with Divinity as a teacher, and at Eleusis took



Photographs by Fred Boissonnas

ON THE STORIED HEIGHTS OF PARNASSUS

Once sacred to Apollo and the Muses, Parnassus is now the haunt of shepherds and guides.

place the solemn worship of the benefactress, the Goddess Demeter. Twice a year the memory of Heaven's inestimable gift was celebrated, the periods falling roughly in the months of February and September, thus synchronizing with the revival and decay of nature.

A part of the celebration was a torch-light procession which left Athens and passed over the Sacred Way. On arrival at the temple solemn initiatory ceremonies took place.

The nature of these Mysteries has long puzzled scholars and archeologists and it is now thought that the details are lost beyond recall. However, one of the great initiates, Cicero, has left on record that the Mysteries taught "not only to live happily, but to die with a fairer hope."

Little is now standing of the ancient structure which greeted the morning sun in all its beauty until the devastating Goths under Alaric swept over Eleusis their besom of destruction.

We approached the precincts through the Propylæa, of which nothing is standing today save the bases of a few columns. The fragments about us are doubtless those from Hadrian's Gateway. Once past these portals, one gains an idea of the grandeur of the original structure. Before and above us is the emplacement of the great Temple of Mysteries, through the portico of which one entered the precincts of the temple proper, cut in some measure into the solid rock of the Acropolis.

But Eleusis is a melancholy place; "Ichabod" seems written wherever one turns, and it was with a sense of relief that we retraced our steps and sought once more the shore and looked out over the silent beauty of the waters toward Salamis.

THE BATTLEFIELD OF THERMOPYLÆ

Railways and Thermopylæ! The two words clash; and yet if one wishes to visit this sacred field he has the choice of leaving Athens over the iron way or else spending days on bad roads, suffering the annoyances and discomforts of Greek country inns, which latter seem built with a view to affording perfect cover for the lesser fauna of the country, with which they swarm.

THE TRAIL OF THE TURK IN ATHENS

A hundred years ago Athens was in the hands of the Turk, and the modern city contains many quarters of oriental appearance.

The railway leads toward the northwest, traversing the Attic plain and the Plain of Bœotia and boldly scaling the rocky fastnesses of Phocis and Doris. Since the completion of this line to Lamia, the wise traveler goes to that point and from there rides to the battlefield.

Thermopylæ, as its name indicates, was so called because of certain hot springs which rise at the foot of the mountain and flow across the plain to the sea. The water in the springs is quite clear, but in its passage through the plain it appears an exquisite bluish green color, with at times a tint not unlike lapis lazuli when the sun is at a certain angle.

The plain to-day is in some places nearly three miles broad and covered with a heavy underbrush. Many changes must have taken place in the topography of the country, for the pass held by Leonidas and his band was less than 200 feet wide—a wall of rock on one side, the sea on the other.

In looking on this scene it is hard indeed not to philosophize a little, recalling that the dauntless courage in the face of certain death displayed at the time gave to the Greeks a moral ascendancy over these adversaries which was never lost. Herodotus tells us that at one time "the very name of the Medes deepened the terror of the Greeks."

It is with a pang of regret that one searches almost in vain in Greek annals for other examples of fortitude and justice and austere virtue which frequently characterized the Romans — a Regulus pleading for a continuance of war, although it involved his own shameful death; a Brutus delivering his own son to the executioner; a Lucrece preferring death to dishonor; a Virginius slaying his own child that she might remain unsullied.

Yet a Spartan mother—she who bore Pausanias—and Leonidas of Thermopylæ occupy places of "high collateral glory" with those Romans. Who can doubt that the real victor at Thermopylæ was Leonidas and not Xerxes?

It is related of these Spartans that certain games wherein the loser would be obliged to declare himself beaten were forbidden by the rulers, for it was found that many youths preferred to give up

Photograph by Fred Boissonnas

A STREET IN THE MOUNTAIN VILLAGE OF ANDRITSÆNA, SOUTHERN GREECE

their lives rather than make such an avowal.

SUNIUM, SUPREME BEAUTY SPOT OF GREECE

I think if I were asked to name the most beautiful spot in Greece, the one in which loveliness and extent of outlook, coupled with a wealth of tradition, make the greatest appeal, my reply would be the Temple of Poseidon at Sunium (see illustration, page 606).

A great author remarks somewhere that no matter what opinion he held, he was always comforted to know that some one else shared it. I confess to a slight gratification in recalling here that Byron says that "in all Attica, if we except Athens itself and Marathon, there is no scene more interesting; to the antiquary and artist (it is) an inexhaustible source of observation and design; to the philosopher the supposed scene of some of Plato's conversations will not be unwelcome."

This beauty patch on the face of Nature lies at the extreme southernmost point of the peninsula which is embraced in the modern province of Attica. It is a rugged headland rising 200 feet above the sea.

Apparently, from earliest times the spot was sacred. Homer and other ancient writers chronicle its sanctity, while its beauty has been sung in modern times by Byron, Chateaubriand, and de Hérédia.

That erudite individual, "every schoolboy," will remember "Place me on Sunium's marble steep." De Hérédia's exquisite sonnet, beginning "Le temple est en ruine au haut du promontoire," is perhaps less well known.

The remains now crowning the steep are from the temple built toward the end of the fifth century B. C.; thirteen massive marble columns are still standing. On one of these Byron carved his name, and this is still visible.

To modern eyes the act seems banal and unworthy of the poet; yet it is interesting to recall that Chateaubriand, who was prevented by high water from visiting the Great Pyramid, charged a friend to write his name thereon, "according to custom," at the first opportunity, and concludes in

a half apologetic tone to defend this, declaring that one must not omit the little duties of the reverent traveler, and asking, "Do we not love to read on the fragment of the statue of Memnon the names of the Romans who heard its sigh at break of day?"

The two writers probably followed what was considered merely conventional a century ago, when that storehouse of trite utterances, the visitors' book, was not so common as now.

Photograph by Fred Boissonnas

A COVERED BALCONY IN ANDRITSÆNA

THE MARBLES OF SUNIUM'S TEMPLE A DAZZLING WHITE

It is interesting to notice that the marbles of this temple, drawn from a near-by quarry, are to-day, after twenty-five centuries of the sea-wind's play, of an unsullied and dazzling whiteness; those of the Parthenon have with time taken on a marvelous golden brown tone, but have better resisted the ravages of years than those at Sunium.

We looked out over the blue waters toward the double line of the Cyclades. In the dimmest northeast distance Eubœa sprawled its length, with Andros and Tenos as pendants to its brown throat.

It was a fair, cool, clear day and the island of Melos was dimly visible, lying almost due south. It was there, it will be recalled, that in 1820 the famous Venus was found and carried to France through the activity of a French diplomatist.

Even while we looked, the kindly breeze freshened and ugly clouds heavy with rain flew up from Oros; fishing-boats, like homing birds, began to run toward the shore; as they drew near, the wind increasing in violence, sail was shortened, and they seemed like huge gulls shot on the wing, as the varicolored canvas came fluttering down to the decks.

There is at Sunium an aged Greek who exercises a guardianship over the ruins. We visited his little garden, planted in a series of irregular terraces sloping down to the sea. Some one recited sonorously Swinburne's "Forsaken Garden," and the fascinating meter so harmonized with the stretch of sea and sky as to give to it a charm such as we had not realized before.

ALONG THE GREEK RIVIERA

There is a bridle and footpath from Sunium to Athens, skirting the coast, necessitating a night in the open—not at

Photograph by Fred Boissonnas

PHALERON, THE SEA RESORT OF MODERN ATHENS

Six miles from Athens and only a short distance from the Piræus, this popular bathing place is connected with both of its larger neighbors by an electric tram. Here in summer French operettas are given in the open-air theater, and band concerts vie with motion pictures for attention.

all disagreeable under the mild Attic sky. Along this riviera are bays and inlets, each of which makes a special appeal, either in the loveliness of its limpid water, in the combination of hill and sea, or else in the friendly forests, which come down to the very water's edge.

About half-way to Athens, near Vari, is a cave dedicated to Pan and the Nymphs, which was visited by Pausanias. Between Vari and Athens are many tumuli which popular tradition gives as tombs of early kings. However, an archeologist who has dug in a number of these assures me that this is not the case.

Within plain view of Athens and crowning a headland is a little chapel dedicated to St. Cosmos. It is a favorite picnic spot for Athenians. The waters of the Saronic Gulf play about the foot of the headland and there is a little bay near by which beckons to the bather. Usually small fishing craft can be taken from this spot for the voyage home.

SPOTS STILL SCORNED BY TOURISTS

From Athens to Corinth is an easy three hours trip by motor; the road follows the Sacred Way to Eleusis, and from this point the sea is constantly in view.

It is hard not to grow enthusiastic over the scenery of Greece, and a word must be said here of the unusual beauty of this tract of country. The mountains rise on the right to a height of several thousand feet; the roadway seems hung against the face of the cliff at many points, rising and falling to take advantage of the changing topography, now within a few yards of the waters of the gulf and again rising far above them.

The hills are covered with pine forests and low scrub, not of sufficient density to mar the perfection of outline. The sight calls up a phrase referring to Greek art, but applicable to its scenery—"The accuracy of its beauty." Looking out over the sea, dancing in the sunshine and dotted with small craft, the eye has a sweep of many miles.

In any country but Greece this section would be filled with hotels and boarding-houses, perhaps a casino, and there would be golf and tennis.

May Apollo pardon me for making known, even in this infinitesimal degree, the compelling beauty of what must have been one of his haunts and one dear to Pan and the Nymphs. Half of me yearns for this loveliness to be known to the elect and the other half shudders at the idea of its possible vulgarization in coming years. To-day all this beauty is practically unknown to the average traveler, and I for one cannot but hope that it will remain so; it is, perhaps, too intimate, too poignant, ever to become a popular tour.

After leaving Eleusis, the principal city is Megara, where the inhabitants rather plume themselves on their Greek descent, set as they are, like an island, in the midst of Albanians, by whom Attica is largely populated.

The Megarian women have the reputation of being very beautiful, and I must say their eyes are fine, but their ankles are vaguely reminiscent of those of a good thick girl, a sister of Hans Brinker, whom I once knew. She sold cream puffs of peculiar flavor near the school I attended, and to her, at twelve years, I gave my heart unreservedly. Through the rosy lens of memory I recall those ankles—solid, substantial, work-a-day, but quite without inspiration to artist or sculptor, or even to an average student of comparative anatomy like myself.

AT PERFIDIOUS SKIRON'S HAUNTS

Toward Megara there are superb views of the sea and the mountains of the Peloponnesus. We climbed slowly and finally passed near the face of an almost perpendicular wall of whitish rock. The road here is supported by buttresses dating from classic times.

On the cliff above us, in ancient times, that well-known freebooter Skiron held out. It will be recalled that one of his engaging tricks, after robbing a traveler, was to compel him to wash his feet, and to kick the wretch into the sea below while thus employed. Our revengeful spirit is gratified by the knowledge that Theseus paid the old villain in his own coin.

A few miles before reaching Corinth, the road crosses the Isthmian Canal, which suggests a sword-cut in the brown earth. This was excavated between 1881 and 1893 and links the Gulf of Corinth with the Saronic Gulf, thus shortening the journey from the Adriatic to Piræus by more than 200 miles. The idea of the

Photograph by Fred Boissonnas

AN OLIVE GROVE ON THE ISLAND OF ITHACA

Olive oil, wine, and currants are the principal products of the few arable acres on the island famous in Greek legend as the birthplace of Ulysses, hero of the Odyssey.

canal was by no means a new one; it was seriously entertained under Cæsar, Nero, and Hadrian (see illustration, page 590).

WHERE LAMIA PRACTICED HER WILES

A short distance from the eastern end of the canal is Cenchreæ, which was in classic times the Saronic port of Corinth. On the road between the two cities one of the earliest "vamps" in history, named Lamia, met a youth of Corinth named Lycius, to his undoing—*vide* Keats. The Lamian method is recommended to our modern motion-picture artists as being equally effective and far more artistic than the Saint Vitusian wriggle and crawl that now characterizes their art.

Not far from the bridge may be traced the ruins of a tramway on which in ancient times small craft and merchandise were dragged across the Isthmus.

The Isthmian games, held biennially, took place here and were especially frequented by the Athenians, their institution being commonly assigned to Theseus.

Two notable historical events are connected with this spot. Here Alexander the Great, before starting on his expedition against Persia in B. C. 336, caused himself to be hailed as the leader of all the Greeks. More than a century later a Roman consul announced to assembled Greeks that Imperial Rome had vouchsafed to them the gift of independence. " 'Tis Greece, but living Greece no more."

Shortly after crossing the canal we enter New Corinth, a modern town of about 5,000 people, which was laid out some seventy years ago, following the destruction of the old city by an earthquake.

Dominating the landscape for miles stands the symmetrically shaped mountain known as Acrocorinth, crowned today by medieval battlements, the work of military engineers in the service of Venice and Turkey and representing the last word in the art of their time—glacis, ravelin, curtain, revetment, scarp and counterscarp, redan.

From the earliest days this bold summit, which rises nearly 2,000 feet above the plain, has been a sacred and important spot. Here was a temple to Venus, of which a few fragments still remain; at the top is the spring Pirene, which legend tells us gushed forth at a stroke from the hoof of Pegasus.

Up to the time of Greek independence the Turks admitted no one to the citadel and but little is known of its history.

The view from this height is one of the finest in Greece. To the south our gaze commands the valleys and hills of Argolis. To the north we look across the town, lying far below us, on to the glossy surface of the Corinthian Gulf; farther to the north, and most imposing in its grandeur, is Parnassus, which raises its head, snow-clad until far into the spring; to the east is the Attic plain, while to the west tower the lofty Arcadian hills.

In the spring and autumn the outlook over the fertile plain is a joy to behold. One cannot but think that St. Paul had in his mind's eye a view from this crest, which he doubtless visited, when he wrote to the Corinthians of his day and, drawing a parallel from the fields of ripening grain below him, argued the soul's immortality.

To an American, Corinth is of special interest, since it is here, on the site of old Corinth, that the American School for Classical Studies has carried on its labors, which have been crowned with brilliant success.

The people of old Corinth have reason to be grateful to the American school and to the American Red Cross, for these two, in conjunction with the municipal authorities, have brought about extensive and costly changes and improvements in the water-supply of the town.

A JOURNEY TO DELPHI

From Piræus to Itea, the port of Delphi, small Greek steamers ply daily, making the voyage in about eight hours. It is only a few miles on horseback, carriage, or foot from the port to the site of the temple, while from Delphi one may ride or drive through the ranges of Parnassus to a point on the railway linking Athens and the north, whence the return journey to the capital is made in a few hours. But of all this more anon.

We left the Piræus early on a May morning. There was still a dash of freshness in the air which made one welcome the warm sunshine. The course lay between Salamis and Ægina, straight to the mouth of the Corinth Canal.

On our left lay a group of islands, beginning with Pente Nisia (the Pelops of the ancients), while beyond were to be

HARVESTING OLIVES IN GREECE

Greece produces 25 quarts of olive oil per capita annually, and the olive is second only to the currant in public esteem. The scraggy, silver-leafed trees form a patch of dusty green on almost every Greek landscape, from which the forest trees have long since disappeared.

seen the mountains of Argolis. On the right was the coast to which we have referred in the excursion to Corinth.

On arriving at the mouth of the canal we were able to enter almost immediately, and the four miles were traversed in about twenty minutes.

Once in the Corinthian Gulf, the little vessel plunged ahead, having on one side the fertile Achæan coast, beyond which lay a range of graduated heights, and on the right, and in full view throughout the day, the unbroken mountain range, with the thrilling summits of Helicon, Parnassus, and Kirphis outtopping all.

The day went as such days go, every few minutes being marked by some new beauty or some object of interest. The sun was sinking beyond the hills when our craft turned its head into the bay of Itea and the lights began to twinkle on the rocks over the little town.

A MODERN GREEK DANCE

We landed in a small boat and repaired to one of the numerous coffee shops which front the shore. In a few minutes we were surrounded by a curious but friendly crowd, among them quite a number who had been in America or who had friends there. With their help we were soon able to complete our bargain for a carriage, and, throwing in our baggage, we started for the home of the Oracle.

We rode on in the gathering gloom through a succession of olive gardens and vineyards which cover the entire plain. At the end of an hour the road began to ascend sharply, and here it was suggested that we might take a short cut up the hillside and arrive in advance of the carriage.

With a Greek boy—Aristides Epiglottis—as guide we started off. It was now black night. Friendly lights winked at us through the trees; there was a heavy earthy smell in the air; from a distant sheepfold a gentle bleating could be heard; occasionally a sheep-dog barked and was answered by colleagues on neighboring hillsides.

As we approached the crest of one of the foothills, there came from a building near by a curious throbbing noise mixed with a rapid movement of feet. My curiosity was so strong that I drew near and looked through the window and saw, in what would be called in olden times the inn parlor, perhaps twenty men, by their dress all peasants, dancing to a singular measure. Hands clasped in a long line, the leader, with a handkerchief in his free hand, making what seemed to be several steps forward and two back. Occasionally he uttered a sharp cry, which might have been a dancing direction. At a given signal he gave place to the man immediately following him, and the monotonous movement went on again.

The music was provided by a sort of drum and flute, augmented by a low handclapping from a few elderly folk seated outside the circle of the dancers. This had been going on, I was told, for hours and would continue into the night. The gravity with which it was conducted was striking.

Leaving the dancers and keeping along the dusty road, we soon arrived at the Hotel of Pythian Apollo, which afforded an agreeable contrast to most of the hotels outside of Athens, being clean, neat, and simple, and with an excellent cook. For this latter my indifference is known to be Gallio-like, but I had to think of my friends!

We were off to bed shortly after dinner, as our exploration was to begin at an early hour. I had foreseen a profound sleep, but the Oracle, doubtless resenting the presence of moderns near her sanctuary, picked out several choice dreams with which to haunt my slumber. These were not of an entirely disagreeable nature. In one of them the Oracle, sitting at the foot of my bed and with features strikingly suggestive of those of my colored mammy—dead 30 years syne—foretold a brilliant career for me.

As the Nubian in question had never while living predicted anything but the gallows as my reward, the wild improbability of such a thing coming from her lips was such a shock as to wake me up. In my second slumber I successfully strangled the Python and awoke with the bedpost firmly clutched in my hands and the warm sunshine flooding my room.

Delphi, to describe it geographically and exactly, is on the steep southern slopes of Mount Parnassus. The general view suggests the auditorium of a gigantic theater, set for a tragedy of Titans,

A SHEPHERD BOY TENDING HIS SHEEP AND CATTLE AMONG THE FOOTHILLS OF MT. PARNASSUS

Photograph by Fred Boissonnas

A SHEPHERD AND HIS FLOCK ON A DUSTY SPARTAN ROAD

"great clouds like ushers leaning, Creation looking on" (see page 608).

The rock barrier to the north has been cleft by some convulsion of nature, and through this opening flow the waters of the Castalian spring, where pious pilgrims went through the ceremonial purification before proceeding to the sanctuary.

By the ancients this spot was considered the center of the world and was called "the navel of the earth." From remotest times Delphi, under the name of Pytho, was a place of pilgrimage. At a certain point in the side of the hill was an opening in the ground, from which from time to time noisome vapors arose. These were said to have the power to intoxicate bystanders.

A temple was built about this opening. Immediately over it was a golden tripod, on which sat a prophetic virgin, later a matron, whose words unintelligible, except to the initiated, were taken down and subsequently communicated, in hexameter verse, to the inquirers by the temple priests.

It will be recalled that the ambiguity of these utterances saved the reputation of the priests in doubtful cases. In the vestibule were carved the famous sayings of the seven sages: "Know thyself" and "Nothing too much."

IMMENSE TREASURE WAS DEPOSITED IN THE TEMPLE

The treasure contained in the temple must have been immense; for, apart from the rich offerings presented to it by kings and private individuals, many of the Greek states made it the depositary of their most valuable possessions.

The remains seen to-day are those of the structure erected in the fourth century B. C. Earthquakes and floods and the hand of man have done their worst, until there is now but little left of what must have been a structure of unusual beauty in a land of wonderful buildings (see illustration, page 588).

On every side are seen, in varying degrees of preservation, temples and treasuries exemplifying a variety of Greek architecture; these were either offerings or served as treasure-houses of various Greek states.

One of the most charming of the latter is the familiar Treasury of the Athenians, which is a small Doric structure said to have been erected with the booty captured at Marathon.

Not far distant stands the Stoa of the Athenians. Along its walls are carved inscriptions dedicating certain slaves to the service of Apollo. This was a Greek method of emancipating slaves, since one dedicated to the service of the god became his own earthly master.

The theater at Delphi is still in an excellent state of preservation. From the seats one commands a view across and up the valley. Far below lies the road over which the pilgrims passed. The acoustics, as is usual with ancient Greek structures, are almost perfect, and the effect of Keats' Ode, though said here in an alien tongue, had rare potency and charm.

DELPHI BY MOONLIGHT

We climbed still higher in the warm sunshine, up to the stadium. Within, the course was carpeted with poppies and there was a buzz of bees in the noonday air. Above us eagles were moving in strong, level flight.

We had brought our lunch and sat down on the green carpet to eat our meal, being careful first to pour a libation to the gods. Our archeological friend laughed as we did this, and pointed to an inscription dating back more than 2,500 years, which forbade the bringing of wine into the inclosure.

The rest of the afternoon was spent wandering at random and alone over the hillside. Night fell upon us gathered once more around the table.

After dinner, since it was moonlight, we visited the Castalian spring and climbed again to the temple and to the theater.

Wisps of cloud began trailing in delicate veils across the face of the moon, earthy smells mounted to us from the valley, now hidden in shadow; a chill wind swept down the pass and the countryside seemed to be repeopled with forms of other days—the lowly and the proud, the rich, the powerful, the weak, the poor, emperor and clown—swinging in an endless procession through a thousand years, to ask of the Oracle the question that has puzzled the heart and brain of man since the world began.

SAILING THE SEVEN SEAS IN THE INTEREST OF SCIENCE

Adventures Through 157,000 Miles of Storm and Calm, from Arctic to Antarctic and Around the World, in the Non-magnetic Yacht "Carnegie"

By J. P. Ault

Commander of the "Carnegie"

THE average man who has been wandering about over the face of the globe is always glad to return to his own home land.

The Icelander born and raised in Reykjavik, after living for a few years in Winnipeg, Canada, returns to Reykjavik, as he says it was too cold for him in Winnipeg. This seems to us to be imaginary until we learn that the temperature rarely goes below 10 degrees above zero Fahrenheit at Reykjavik.

The South Sea Islander, after a brief sojourn in the United States, returns to his island home, as the rush and strife of civilization were too confusing for him.

Even the Eskimo, who faces a continuous struggle to survive in the frozen north, would not trade places with the Samoan, whose life of ease is fabled in song and story and who faces an existence characterized by Stevenson as "one long, unbroken uniformity of days."

On the other hand, the man who has traveled is always the envy of him who has had to remain at home; and so we are never content. To this spirit of discontent, this refusal to ignore the challenge of the Earth's wide spaces, of her untraveled latitudes, we owe our present knowledge of the world's geography.

In visiting the remote corners of the world our first impression reveals how little we really know beforehand of these places and of their people. And the people who dwell in those distant places know, perhaps, less of us and of our country. The American "movie" has done much to enlighten them about certain of our habits and customs, but the net result has been that every American is considered to be wealthy.

The prospect of taking an automobile sight-seeing trip over the lava fields of Iceland had never been suggested to our imagination. The American peanut was as unfamiliar to the people of Hammerfest, Norway, as is the mangosteen of India to us. At first they tried to eat the shell and all.

PURPOSE OF THE "CARNEGIE" CRUISES

To increase our knowledge of the constitution of the Earth's magnetic field and to learn more of the amount and variation of the electricity in the atmosphere surrounding the Earth, the non-magnetic vessel, the yacht *Carnegie,* has been making her cruises since 1909.

Carrying out the idea of the Director, Dr. Louis A. Bauer, the Department of Terrestrial Magnetism of the Carnegie Institution of Washington, in 1905 began making a general magnetic survey of the globe, both on land and at sea.

In the course of the ocean work a great many interesting places have been visited during the three cruises of the *Galilee,* 1905 to 1908, the first vessel used by us in making a survey of the Pacific Ocean, covering 73,508 statute miles, and during the six cruises of the *Carnegie,* 1909 to 1921, covering 291,595 statute miles.

This article is concerned only with the *Carnegie* cruises III, IV, and VI, which are shown on the accompanying track chart (see page 634).

To relieve the tedium of chronicle, these three cruises will be outlined briefly, thus serving to orient the reader properly as to time and place. Cruise III, covering 11,009 miles, began at New York in June, 1914, and ended at the same place in October of the same year, calls being made at Hammerfest, Norway, and at Reykjavik, Iceland.

Cruise IV, covering 73,009 miles, began at New York in March, 1915, and

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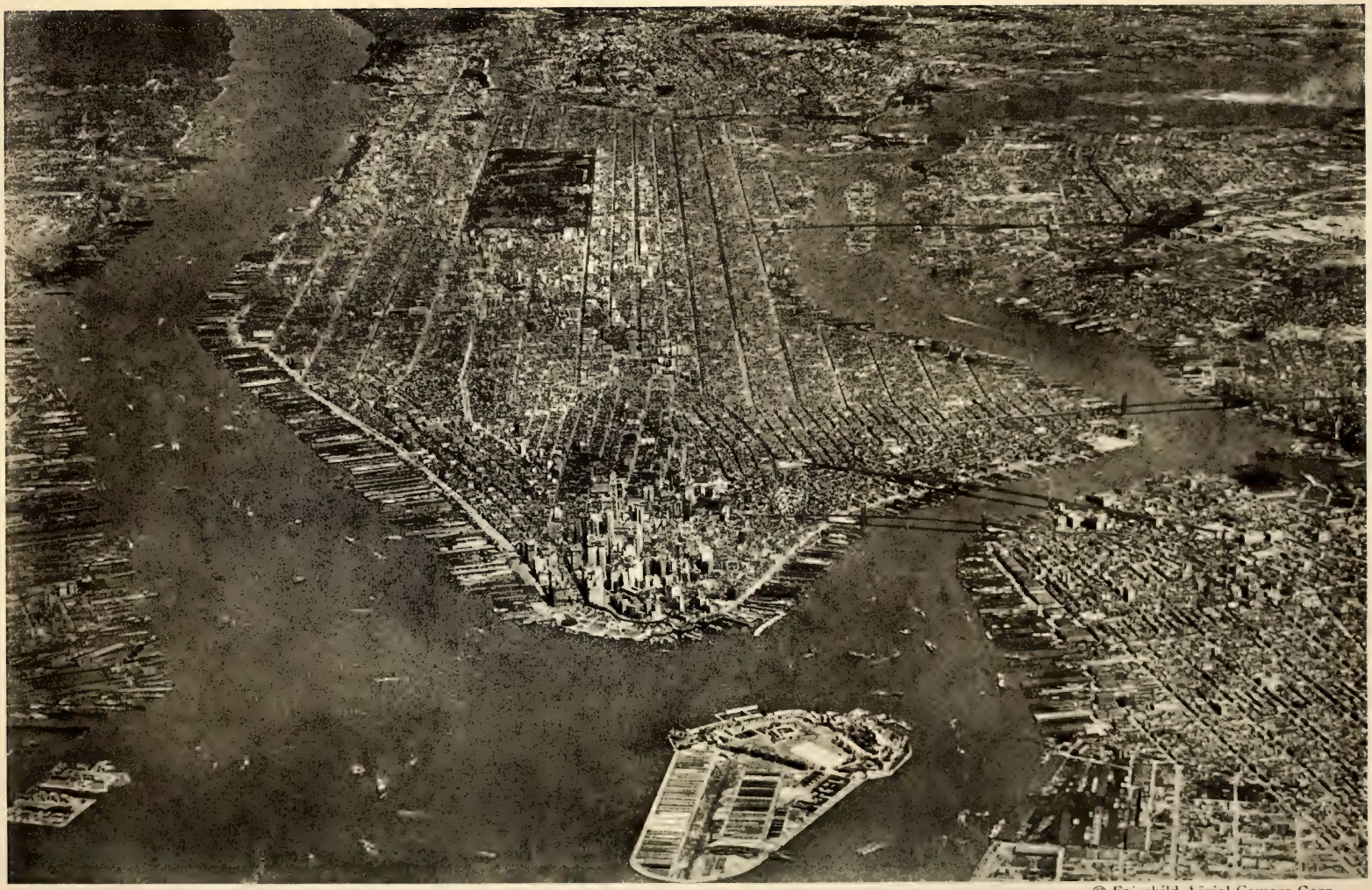


© Fairchild Aerial Camera Corp.

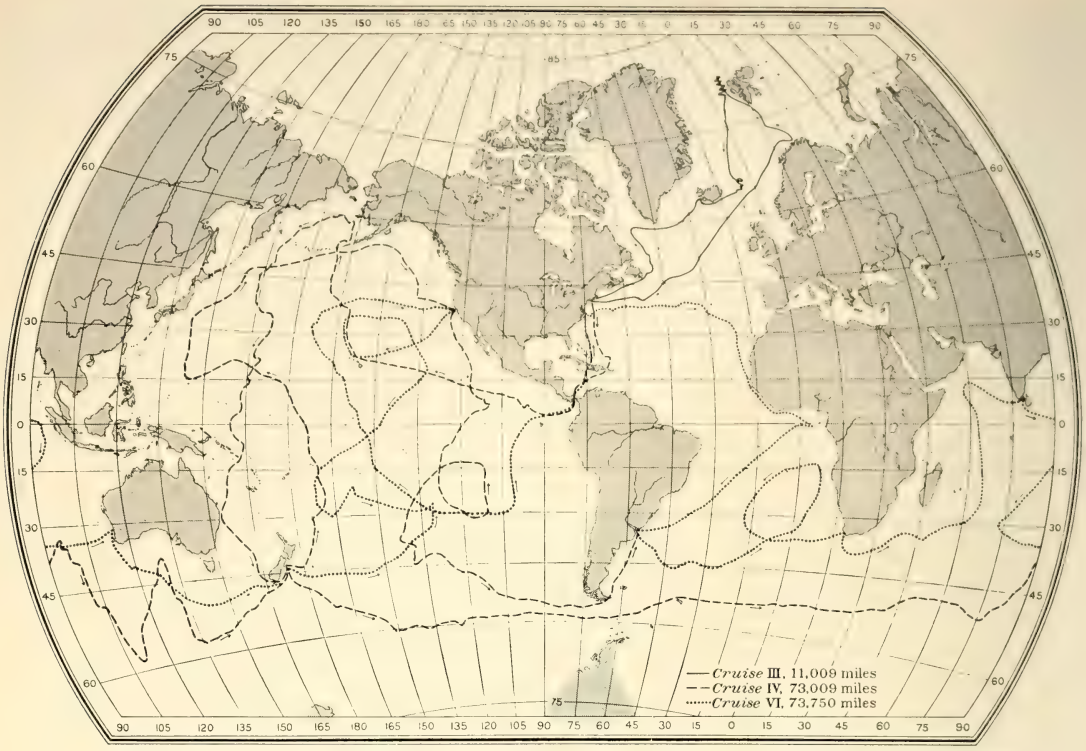
STARTING POINT FOR THE "CARNEGIE'S" CRUISE TO THE FAR NORTH

Manhattan Island and the New York, Brooklyn, and Jersey City waterfronts as seen from the air. In the middle foreground is Governors Island.

Photograph by L. Boulanger

THE HARBOR OF HAMMERFEST, NORWAY, MOST NORTHERLY CITY OF EUROPE

This was the first port of call for the *Carnegie* after leaving New York, a distance of more than 4,000 miles, covered in 24 days. The harbor of Hammerfest presents an animated picture in summer, when fisher-craft throng its waters.



Drawn by A. H. Bumstead

A CHART SHOWING THE ROUTES TRAVERSED BY THE "CARNEGIE" DURING THREE VOYAGES, COVERING 157,000 MILES

This outline chart is drawn on the same copyright projection as that used for the National Geographic Society's new Map of the World, which is issued as a supplement with this number of THE GEOGRAPHIC (see text, page 690).

ended at Buenos Aires, Argentina, in April, 1917, the route being mainly in the Pacific Ocean and including a circumnavigation of the globe in sub-Antarctic regions.

Cruise VI, covering 73,750 miles, began at Washington, D. C., in October, 1919, and ended at the same place in November, 1921, the vessel making a complete circumnavigation of the globe by way of the Atlantic Ocean, around the Cape of Good Hope, up through the Indian Ocean, and, after spending almost a year in the Pacific Ocean, home through the Panama Canal.

In this article the well-known places visited will be described only briefly, more details being given concerning those places about which very little has been written.*

* The reader will find the National Geographic Society's new Map of the World, issued as a supplement to this number of the Magazine, invaluable in following the itinerary of the *Carnegie* as described by the author.

Our stay at any one place rarely exceeded three or four weeks.

THE FIRST GLIMPSE OF THE MIDNIGHT SUN

Hammerfest, Norway, was the first port reached after leaving New York in June, 1914. The 4,152 miles between these ports were covered in 24 days, giving an average of 170 miles per day, the highest ever reached by the *Carnegie*.

We were in latitudes of continuous daylight from June 24 to August 13, the sun never disappearing below the horizon, but frequently being obscured by cloud or fog, making navigation somewhat difficult and dangerous as we crossed the iceberg region off Newfoundland.

When we arrived off the entrance to Sörö Sund, ready to make port and sail up to Hammerfest, we encountered a heavy gale and were tossed about by mountainous seas, beginning a habit which

Photograph by L. Boulanger

CODFISH-DRYING RACKS AT HAMMERFEST, NORWAY

There is no sunset in Hammerfest from May 13 to July 29. This is, therefore, the busiest season of the year, when fishing craft set out for fisheries as far away as Spitsbergen and the Kara Sea beyond Novaya Zemlya. The city's chief export trade is in cod-liver oil, salted fish, reindeer and fox skins, and eiderdown.

persisted throughout the cruises of the *Carnegie*.

Often when trying to make a landfall and enter port we would experience adverse winds or calms, and the winds usually would develop into storms or gales before we were allowed to enter the harbor.

On a surprisingly large number of times we arrived off the port after nightfall. The *Carnegie* being primarily a sailing vessel, we could not specify the hour of our arrival.

After being "hove to" for 24 hours, we at last anchored off Hammerfest at 1 o'clock in the morning of July 3. We were ready to turn in and have a sleep, but the whole town seemed to be awake and ready to welcome us, and so our sleep had to be postponed.

The five-hour trip from the entrance of Sörö Sund to Hammerfest, through quiet waters, in the midst of snow-capped peaks, gave us some idea of the wonderful mountains and fjords for which Norway is famous. We had our first glimpse of the midnight sun as it swung around the northern horizon, just skimming the mountain tops.

Many vessels of all sizes and description were busy at fishing, the chief industry of Hammerfest. While riding at anchor in the harbor we early became aware of the presence of the many fish-drying places on shore, and our land stations later were selected with due regard for these locations, the "local disturbance" being reduced to a minimum at a distance of one mile to windward. We would see boats crossing the harbor loaded high with what seemed to be cordwood, but closer inspection showed the cargo to be dried fish stacked up on deck.

Warehouses were full of dried fish awaiting shipment, and many vessels were in the harbor loading fish for Russian ports. This was early in July, and already the hundred or more ships of the

Photograph by A. B. Wilse

THE SEVEN SISTERS, CELEBRATED WATERFALLS IN THE GEIRANGER FJORD, NORWAY

Fluttering in the breeze like long silken streamers, these gossamer waters often enshroud the carbon-black walls of the fjord. Usually only four falls are visible from below.

sealing fleet had returned from their season's work in the north and were tied up in the harbor awaiting the return of another season.

Hammerfest, at about 72 degrees north latitude, is the most northerly city of Europe, and the winters are so long and cold that very little vegetation can survive. The people are very proud of the small group of birch trees growing in the valley back of the town, the only trees for miles around.

While wandering over the hills viewing the sun at midnight, we found numerous violets and other flowers growing among the rocks. The principal fuel is dried peat, which is burned in small stoves specially constructed for this purpose.

The houses are small frame buildings, often thatched with turf, and most of the homes have numerous indoor plants and flowers, which serve to cheer up the long winter months when the sun has disappeared or shines for only a few hours at a time.

A FINNISH BATH

At Hammerfest we enjoyed the unusual experience of a Finnish bath. One or two of the houses in town are specially constructed for this purpose.

Built into the wall in the bathroom is a stove made of large stones, which forms a homemade furnace. The fire in the stove heats the stones very hot, and when water is thrown upon them the room is soon filled with steam. As the bath progresses and the bathers, three or four being taken care of by one attendant, become warmed up, more and more water is thrown upon the hot stones.

A series of shelves in one end of the room enables the bather to increase the degree of heat by climbing up nearer and nearer the ceiling, until on the top shelf he may suffocate if he raises his head too high. Next he is scoured and scrubbed down with vegetable sponges and pounded with bundles of switches, which are wielded with no gentle hand, until he finally is ready to leave the steam-room.

Then, after several buckets of increasingly colder water have been thrown upon him, he is treated at last to a shower of ice-cold water direct from the glacier back of the village.

It was almost a "finish" bath.

Sailing from Hammerfest on July 25, we little dreamed of the war clouds which were already gathering over Europe. We were intending to sail eastward into the Kara Sea beyond Novaya Zemlya, but after rounding North Cape we were headed off by a northeast wind.

SPITSBERGEN, A LAND OF PERPETUAL SNOW AND ICE

As time was short, it was decided to push north as far as possible, up into the "Whaler's Bight," west of Spitsbergen, a triangular area with the small angle to the north, kept open for a few months during the summer by a branch of the warm North Atlantic Drift.

On July 30 we were becalmed in sight of Bear Island, and the next day we sighted our first ice. About two hours after sailing through a group of "growlers," or small detached icebergs, we met the solid pack which had drifted down out of Stor Fjord, around South Cape of Spitsbergen, and extended 30 miles westward. It was necessary to tack back to the south again for 10 miles to avoid this ice.

On returning again to the northward we cleared the pack and had great hopes of reaching 80 degrees north before the ice should compel a return. Sailing along the coast of Spitsbergen, with its lofty needle peaks clothed to the summit with a perpetual mantle of white, the 50-mile-wide valleys filled with glaciers flowing into the sea and blocking the bays and harbors with huge icebergs, was an impressive experience.

About 4 o'clock in the morning a southerly gale began to blow, threatening to force us into the solid polar ice pack or to block our return to the south.

Visions of being compelled to winter in this desolate place with our limited supplies and light equipment began to stare us in the face. We realized our danger and at once turned about and began our five-days' struggle to force our way southward against the teeth of the gale.

We had reached within sight of 80 degrees north, within 600 miles of the North Pole, just off Danes Island, the island from which Andrée started on his ill-fated balloon expedition across the North Pole in 1897.

With our engine running and fore-and-

Photograph by Magnus Olafsson

ISAFJÖRDUR, ON THE NORTH COAST OF ICELAND

This, one of the more progressive cities of Iceland, has a population of 1,854. It is a typical fishing and trading town and owns a fleet of motor fishing-boats.

Photograph from The American-Scandinavian Review

CARRYING HOME THE HAY

These figures are not giant porcupines; they are Icelandic horses, each carrying two bundles of hay weighing from 175 to 200 pounds.

Photograph from A. B. Wilse

CUTTING A HUGE WHALE AT A SHORE STATION IN THE FAR NORTH

The cutters, or "flensers," make longitudinal incisions in the blubber of the whale, and then peel it off like the skin from an orange. When the "blanket pieces," as the blubber strips are called, have been torn from the carcass, they are cut into blocks, dumped into enormous vats, and boiled, or "tried out," for oil.

aft sails set, we were able to make slow headway south, while tacking back and forth 12 times off the coast of Spitsbergen. We had occasional glimpses of Queen Maud Glacier, 50 miles in width, of Magdalena Bay, with its imprisoned icebergs, and of Prince Charles Foreland, as from time to time we would emerge from the fog and cloud of the storm into the clear skies along the coast during our struggle out of the grip of the Arctic.

During the first 24 hours of the storm we were able to make only 30 miles to the southward, but each mile gained meant that much additional safety. The gale finally surrendered and, the wind shifting to the westward, we proceeded toward Iceland, sighting Jan Mayen on the way, glad to be safely out of that dangerous region.

At Reykjavik, the capital of Iceland, the pilot met us with our first news of the war—all Europe in a turmoil and the Germans within a few miles of Paris!

Our amazement can readily be imagined, and our interest in Iceland, with its huge glaciers, its immense lava fields, and its peculiar climatic conditions, became secondary to our interest in the daily cabled news from Europe.

ICELAND, THE LAND OF THE SAGAS, THE OLDEST LITERATURE OF EUROPE

The southern shores of the island are bathed by the warm waters of a branch of the North Atlantic Drift, and the northern shores are infested with icebergs borne on the cold waters of the Greenland Current. A meeting of these two extreme conditions creates continuous atmospheric disturbances. Wind and rain, storms and gales, were almost incessant during our stay.

The harbor of Reykjavik is noted for unusual local magnetic disturbances, and

© A. B. Wilse

IN CROSS BAY, AT THE BASE OF ONE OF SPITSBERGEN'S GREATEST GLACIERS

Lilliehöök Glacier's ice wall rises from 50 to 100 feet above the water.

the compass cannot be relied upon while entering the port. On shore the magnetic declination changed two degrees in 80 paces, and the value on one shore differed by 15 degrees from the value on the other shore, three miles distant.

Of 90,000 people in Iceland, 12,000 live in Reykjavik, the capital city.

Farming and fishing are the chief industries, and we often saw halibut weighing 300 to 400 pounds being brought to market. The haddock and the fresh-water salmon were excellent. Vessels at anchor in the harbor were filling their holds with fresh fish, alternating with layers of salt, and when loaded, were sailing for northern Russian shores.

PROHIBITION IN ICELAND

The government of Iceland was forced by the war to charter a vessel and send to the United States for food, perhaps the first time a vessel from this island had visited our shores since the days of the old Norsemen. Prohibition was to go into effect October 1, 1914, thus pointing the way for other nations.

Forty-seven thousand Shetland ponies are raised, chiefly for export, and the sheep number about 900,000. During the short summer season many vegetables can be raised, but the potatoes grow only to the size of walnuts. The grass is usually cut by hand because it is so short, and the whole family takes part in the haying process. The hay is brought to market by ponies, the chief method of transportation on the island, each pony carrying two huge bundles. Thus the crop is estimated at so many pony-loads (see p. 638).

Iceland is the Land of the Sagas, the oldest literature of Europe, of which Sir Rider Haggard says: "Too ample, too prolix, too crowded with detail, they cannot vie in art with the epics of Greece; but in their pictures of life, simple and heroic, they fall beneath no literature in the world, save the Iliad and the Odyssey alone."

The language in use to-day is the same as the ancient language used among all Scandinavian countries, the Icelanders alone having preserved it, chiefly due to the remoteness of their island.

Since December 1, 1918, Iceland has been recognized as an independent state, united with Denmark only through the identity of the sovereign. The island is about 310 miles long from east to west and 190 miles wide from north to south, with an area of 40,000 square miles.

More than one-eighth of the island is covered with glaciers, and an equal area is covered with old lava fields. An automobile trip over one of these fields of desolation showed a picture of destruction difficult to describe, and the continuous wind and rain of the day gave an added touch of gloom to the scene.

At the small country villages where we stopped the meals were excellent. Our hosts were very apologetic for being unable to give us what they thought we would like to eat; so we were constrained to assure them that the tinned food which was a luxury to them, and to which we were more than accustomed, could very well be omitted in favor of their fresh chicken, excellent haddock, and fresh-water salmon.

We called on the pastor of a quaint little country church on the way, and the exchange of points of view was mutually refreshing.

In Iceland, as in Norway, many plants and flowers are grown indoors, and some especially large geranium blooms were seen.

We were glad to sail for New York out of the stormiest harbor we had ever visited. Gales were of frequent occurrence, and one night the vessel dragged the one anchor that was down and was almost ashore before the other anchor could be let go. Even on the day we sailed a gale was blowing, and we were compelled to ask one of the steamers in the harbor to tow us out, as our engine was not powerful enough to drive the vessel against the heavy wind.

FROM NEW YORK IN A BLIZZARD TO THE TROPICAL HEAT OF PANAMA

We started on Cruise IV from New York in a blizzard, March 6, 1915. Within one week we were in the tropics and wishing for cool weather. During one of the heaviest gales, off Cape Hatteras, about 4 o'clock on a dark, stormy morning, the cook decided to try the great adventure and jumped overboard. A life buoy was thrown into the water, and the vessel was hove to, but the heavy seas running prevented launching the boat.

Photograph by J. P. Ault

THE "CARNEGIE" IS "HOVE TO" IN A HEAVY SEA

The huge waves pile up, but the smoking crests are flattened and scattered by the force of the wind.

We finally had to go on our way without seeing the cook again.

The *Carnegie* passed through the Panama Canal early in April, 1915, just before a landslide in Gaillard Cut stopped all traffic for several months.

THROUGH SEAS TEEMING WITH BARNACLES, FLYING FISH, AND BONITO

In the middle of the North Pacific Ocean, while en route for Dutch Harbor, for four days the vessel was passing through fields of barnacle clusters, extending as far as the eye could see in all directions. The tiny barnacles attach themselves to the small floating organism called the velella, a relative of the Portuguese man-of-war, and gradually grow and envelop it until a large cluster nearly 12 inches in diameter results.

After passing through these barnacle clusters, we were for several days passing through similar immense numbers of the velella. Occasionally, during calms, sharks, some of them 11 feet in length, were caught, and the small, brightly colored pilot-fish, which usually swam a little in advance of and directly above the shark's head, would dart wildly here and there trying to find its lost companion.

The flights of flying fish provide interesting material for study and speculation. These fish range in size from a few inches to nearly two feet in length, and the wing shape and size are quite varied. Some cannot maintain flight beyond the distance which their momentum gives them; others continue by dropping the tail into the water and giving it a few quick twists, while others continue flight for some time, changing direction and going much farther than momentum would carry them. The actual vibration of the wing fins has been seen frequently by several observers.

Often we have seen the bonito, or Spanish mackerel, pursue and seize the flying fish even in mid-air, and again some fish would escape its enemy below the water only to be picked out of the air by the gannet-bird swooping down from above.

Occasionally schools of porpoises visited the vessel, playing about the bow,

Photograph by Capt. C. T. Pedersen

LEAVING THE VILLAGE OF UNALASKA, ALEUTIAN ISLANDS

The Russian church is seen at the right—a reminder of the days when Alaska was a possession of the Tsars.

darting ahead to show their speed, or flinging themselves high in the air and turning veritable somersaults in the abandon of play.

At other times schools of Spanish mackerel were encountered, and a dozen or more 6-pound fish have been caught in a few minutes by dipping a hook into the water under the jib boom.

Some bright metal object or a white rag must be tied to the hook to resemble a flying fish to attract the mackerel, and at times three or four of them rush at the hook at the same time. This fish is a welcome change from the usual canned meat diet which is our daily portion at sea.

Upon one occasion a large fish resembling a horse mackerel accompanied the vessel for days, sometimes leading the way and at other times keeping abreast of the stern of the ship. All night long his position could be determined by his brilliantly lighted phosphorescent trail.

Dutch Harbor was a port of call for steamers en route to and from the north during the Klondike rush, but is now almost deserted in favor of Unalaska, a small town across the island and inlet to the south. A herd of reindeer is still maintained on the island as a reserve food supply in case of need.

Mountains seem to have been dumped in profusion all over the surrounding landscape.

IN AN ARCHIPELAGO OF VOLCANIC PEAKS

The Bogoslof Islands (north of Unalaska) were sighted at midnight, shortly before we reached Dutch Harbor. These islands have changed shape frequently, due to volcanic action, peak after peak appearing in successive seismic disturbances, only to be blown up and disappear in a later eruption.

The roundabout route to Lyttelton, New Zealand, extended up through the Bering Sea, "for ne'er can sailor salty be until he sail the Bering Sea," past the Pribilof Islands, famed for their seal rookeries, and south through the pass west of Attu Island, the westernmost of the Aleutian group.

During the 89 days of this trip all kinds of wind and weather were experienced, and for the first 75 days not a sail was seen.

Photograph by J. P. Ault

THE "CARNEGIE" AT LYTTELTON, NEW ZEALAND, DRESSED IN HONOR OF ANZAC DAY

When off Wake Island we were running before a hurricane for 20 hours at 11 miles per hour under bare poles, with not a sail set. The force of the wind drove the rain through every crack and crevice of the ship, and everything and everybody on board was wet through. Fortunately we had a clear path and no company.

After the storm we avoided being wrecked on Wake Island one dark night only by keeping a sharp lookout, or rather by keeping our ears open and hearing the roar of the surf on the beach when only one-half mile offshore, no land being visible. By immediately changing our course 90 degrees we sailed out of danger.

Many a ship has come to grief on the gleaming white coral beach of the myriad low-lying islands, reefs, and atolls which dot the South Pacific Ocean. Numbers of these coral atolls are no higher than ten feet, making them invisible except at short distances. The regular winds are usually interrupted or die out altogether in their vicinity, making navigation difficult and dangerous.

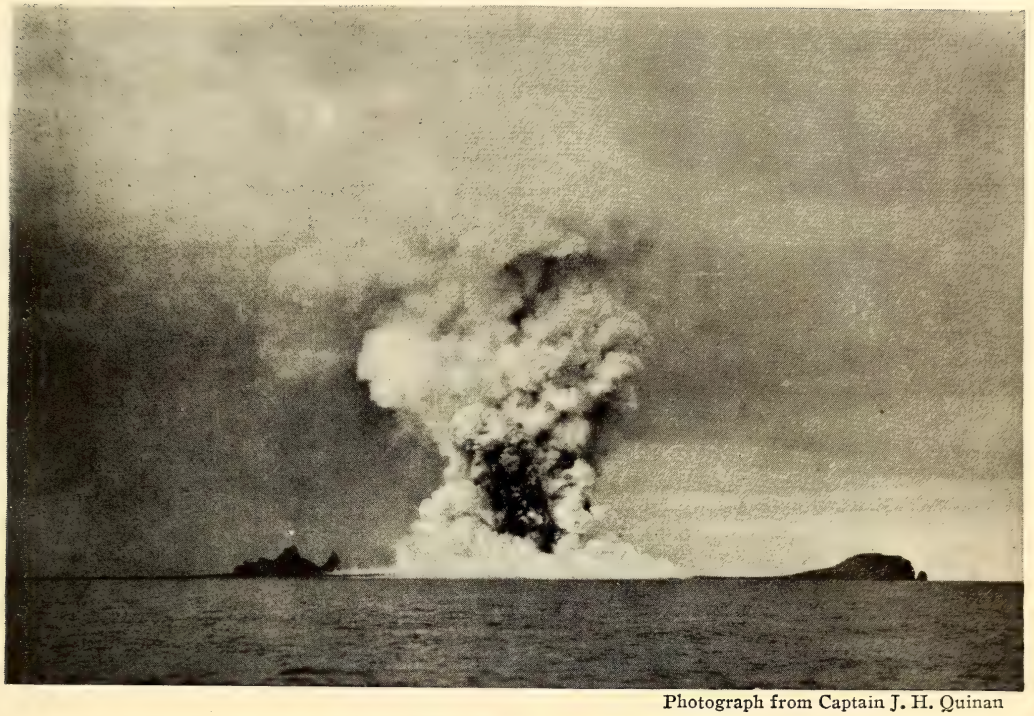
At times there has seemed to be a perversity in the elements when we were approaching some of these dangerous islands, the wind shifting gradually as we advanced, as if determined to force us upon the shore. The heat radiating from the land areas causes upward currents of air in their vicinity, thus disturbing the regularity of the winds.

So we sauntered on down the latitudes toward New Zealand, diving through the Marshall Islands, skirting the Solomon group, and dodging the Indispensable Reefs, marked only by a white line of breakers in the midst of the sea, with one small rock showing above the surface.

LYTTELTON, THE GATEWAY TO THE ANTARCTIC

Lyttelton (the seaport for Christchurch), situated at the gateway to the Antarctic, has been the last port of call for nearly all the exploring expeditions which have plunged into the Antarctic through the Ross Sea.

Nestling in the midst of the Port Hills, which alone break the even level of the broad, beautiful, and richly productive



Photograph from Captain J. H. Quinan

AN EARLY MORNING VIEW OF THE VOLCANIC PLUME OF SMOKE RISING FROM BOGOSLOF ISLAND, ALASKA

Canterbury Plain as it sweeps westward toward the lofty mountain ranges along the west coast, it is one of the most picturesque harbors in the world.

We found the people thoughtful and hospitable, even though practically every family had a son or daughter at the war front, many of whom already had fallen during the terrible campaign at Gallipoli.

Here we made final preparation for the most strenuous trip the *Carnegie* had ever undertaken, a circumnavigation of the globe in the sub-Antarctic regions in one season, a feat never before attempted.

At New York a belt of brass plate a quarter of an inch thick and four feet in width had been placed on the vessel's hull at the water line as a protection against floating ice. At Lyttelton other precautions were taken to guard against damage from heavy seas and to protect the crew against cold weather.

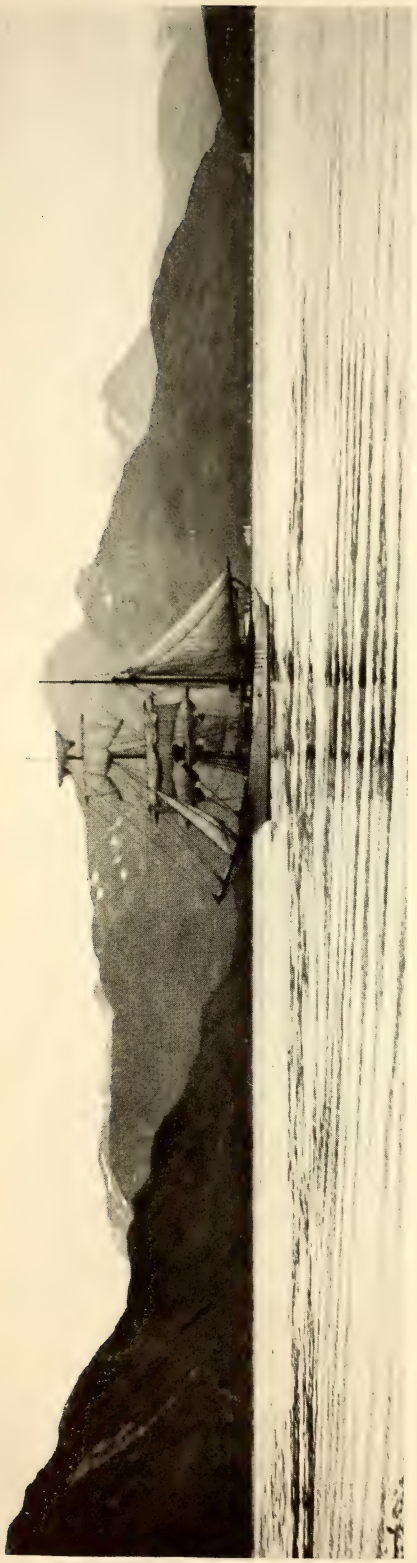
With some difficulty a crew was obtained which was not afraid to venture into the unknown on a voyage through the cold, stormy, and iceberg-infested regions of the Southern Ocean. This was accomplished only by paying more than the usual rates and by promising a bonus of an extra month's wages at the conclusion of the four months' trip upon our return to New Zealand.

One seaman was bailed out of jail the morning of our departure. Upon our arrival at Lyttelton he had promised to go with us on the trip around the South Pole, but had requested leave without pay during our stay in New Zealand, as he knew he would be unfit for duty, owing to the proximity and accessibility of drinking places.

His frankness and honesty deserved consideration, and so the arrangement was made. His money was kept on board and was given to him a little at a time. He was often in trouble and occasionally his fine would be paid and he would be relieved from custody, but for the most part his leave was spent in jail.

DODGING ICEBERGS IN THE FOG AND GALES AROUND THE SOUTH POLE

Leaving Lyttelton on December 6, 1915, we sighted the Antipodes three days later, and in two weeks we had met our first iceberg at 60° 80′ south latitude. Early



Photograph by J. P. Ault

THE "CARNEGIE" IN DUTCH HARBOR, ALASKA, WITH SAILS PARTLY SET FOR ATMOSPHERIC-ELECTRIC OBSERVATIONS

the next morning we had our initiation into the difficulties and dangers of Antarctic navigation.

After leaving the "roaring forties," we had crossed the "furious fifties" and were now in the "ice-clad sixties," where constant watchfulness and careful seamanship were necessary to prevent disaster.

Towering ice islands loomed up on every side out of the fog, mist, and driving snow. They became so numerous that the course had to be changed frequently and quickly, while the small pieces of ice, or "calves," scattered about were a constant menace. It seemed like trying to sail down Broadway with all the skyscrapers gone wild and drifting around in our pathway.

These huge bergs were immediately north of the close ice pack encountered by Ross in 1842. They had broken away from the great ice barrier which surrounds the Antarctic Continent and were slowly drifting northward, where they would finally break up, melt, and disappear in the warmer latitudes.

THIRTY BERGS SEEN IN ONE DAY

More than 30 icebergs were sighted the first day, the largest number seen in a single day during the entire trip around the South Pole. The temperature of both the air and the sea water dropped to half a degree below freezing, the lowest temperature experienced during the cruise. Our heaviest snowfall accompanied the lowest barometric pressure recorded—28.26 inches.

For more than eight days we were sailing almost due east among icebergs more or less numerous, with cold, damp weather, fog, and blizzards. The last berg seen before nearing South Georgia was sighted near the position given for Dougherty Island, and at a distance was mistaken by everyone on board for an island.

Orders were given to start the engine in order to land on the new island, but an approach within three miles revealed the fact that our new discovery was another iceberg. The reflection of the light from the vertical face resembled a dark, rocky cliff, and the sloping top showed white, making the whole appear as a snow-capped, rocky island.

The poor visibility in the neighborhood of these icebergs may explain the numerous reports of islands discovered in the early days which have never been seen by later navigators. Dougherty Island seems to be one of these lost islands of the Pacific. We sailed over its reported position on December 25, and nothing was visible for more than 40 miles in any direction. Our own position was well determined, and the visibility that morning was good.

We sailed on a zigzag course to the eastward on the assumed latitude of Dougherty Island for over 200 miles. During a part of this trip we were following or intersecting the historic route taken by Sir James Ross, over 70 years ago, in the ships *Erebus* and *Terror,* in order to determine the changes which have taken place in the Earth's magnetism since his magnetic observations were made.

SOUTH GEORGIA, SIR ERNEST SHACKLETON'S LAST RESTING PLACE*

Off Cape Horn we had the finest weather of the entire trip. Being well south of the Horn, near 60 degrees south latitude, we had clearing skies and light northerly winds. A few days later, in the fog of the early morning, we found ourselves in the midst of 20 large icebergs, which seemed to have met as an outpost off the northwest point of the island of South Georgia.

In the poor visibility, ice islands and land islands were almost indistinguishable, as we could see less than a quarter of a mile in the fog, and we were to leeward of the northwest point of South Georgia before we were aware of it. It was necessary to call on the engine to extricate the vessel from her embarrassing nearness to these huge masses of ice and to beat to windward in order to weather the point.

As we sailed along the north coast of South Georgia, about which so little is heard, enveloped as it is in the cold mists and mystery of the little-known Southern Ocean, the weather cleared and we had a magnificent view of snow peaks, rugged, cold, hard mountains, with immense glaciers flowing between and the valleys partly filled with fog banks.

We remained in King Edward Cove only two days, taking on fresh water and some fresh provisions, including potatoes, pork, and mutton. Sir Ernest Shackleton had stopped here a few months previous, before plunging into the darkness and silence of the Antarctic on his ill-fated vessel, the *Endurance;* and he now has found a last resting place on the rugged hillside overlooking this snug little harbor, where seasons may come and go and where hurricanes and blizzards may blow at will.

The six whaling stations on the island employ more than 1,000 men and produce about 240,000 barrels of whale oil annually. A monthly steamer to Buenos Aires connects them with the outside world. The Argentine Government maintains a meteorological station at King Edward Cove, and the wife of the observer in charge was the only woman at this station. There were only two women on the entire island.

The shore whaling station flenses the blubber from the whale, and then the remainder is sold to the floating factory, located on a large sailing vessel anchored in the harbor. Frequently whale carcasses drift about the harbor and strand upon the beach, some just under the window of the meteorological observer's home, remaining there until absorbed by the all-suffering air.

No poetic phrases can describe the odor which is the hourly portion of those who dwell on the shores of this beautiful harbor. The beach is several inches deep with grease and whale refuse, affording rich pasturage for the several hogs kept at the station to vary the whale meat food supply.

Some of the members of our party refused to eat the nice, fresh pork because the pigs had not lived in green meadows during their lifetime. The whale steak, after being spiced and soaked for two days, was quite palatable, and the smoked whale meat differed very little from smoked beef.

The people were extremely hospitable and loaded us with gifts of penguin eggs, whale ear bones, and sea elephant tusks.

The penguins, funny little creatures,

* See "South Georgia, an Outpost of the Antarctic," by Robert Cushman Murphy, in THE GEOGRAPHIC for April, 1922.

Photograph from Herbert E. Gregory

MAORIS OF NEW ZEALAND USING THE HOT SPRINGS OF THEIR NATIVE LAND AS STEAM COOKERS

The thermal springs of New Zealand cover an area of 5,000 square miles. They are a source of great interest to tourists and their healing properties are widely recognized.

half fish, half bird, and fairly human in their curiosity and comic actions, were an interesting study (see illustrations, pages 657, 662, and 668).

After we left the snug safety of King Edward Cove and plunged into the stormy seas of the Southern Ocean, the icebergs became larger and more numerous and the fog thicker and more persistent.

Some of the icebergs were 400 feet high and five miles long—flat, table-topped bergs of regular outline. One loomed up through the fog as a vast extent of dark land, with the bright iceblink reflected from the fog above it.

LINDSAY ISLAND HAS BEEN SEEN BY FEW NAVIGATORS

We passed along the north coast of Lindsay Island about three miles from shore, obtaining a good view of this lonely, desolate place, with its deep mantle of snow and ice surrounded with wrecked icebergs which had come to grief on its shoals. The island is only four-and-a-half miles long and is almost entirely covered with glaciers.

We had no difficulty in locating the island. When our reckoning placed it about 10 miles southeast of the vessel, we were able to locate it in the proper direction, in the midst of a driving cloud and fog bank which surrounded the land, by noting the white streak of a glacier which remained fixed in position and outline. A delegation of six penguins came out to greet us, and these were the only ones seen in this vicinity.

The only sign of human kind seen on the entire trip of four months, except at South Georgia, was the naked body of a dead man floating in the open sea between Heard and Kerguelen Islands, far from land and remote from any regular steamer routes. Stormy weather and thick ice prevented our sighting Thompson and Bouvet Islands and compelled us to omit a contemplated stop at Kerguelen Island.

HEAVY STORMS SOUTH OF THE GREAT AUSTRALIAN BIGHT

The stormiest period of the trip awaited us south of the Great Australian Bight.

A storm at sea is an awe-inspiring experience and is always a time of anxiety until the temper and fury of the wind have passed their climax. The wind howls and shrieks through the rigging; the ship moans and shudders from stem to stern; the seas pile up and rush upon the tiny craft like so many laughing demons, threatening to overturn and engulf her and shaking her in their rage; often they climb right on board and sweep her from bow to quarter-deck.

Then, after a lull the storm seems to redouble its fury; the wind fairly screams; the ship rushes headlong, rises on a huge wave and nearly overturns, as she rushes down the far side of the crest into the trough below. Huge seas curl up and break behind the man at the wheel.

But the vessel is staunch and rides on, emerging from the heavy seas with water pouring from every scupper, with huge waves alternately slapping her on the bow and pounding her on the stern, or climbing on board in an effort to swamp her. No sails can be set, and she scuds along at full speed under bare poles. If the storm is too severe, the vessel is stopped and "hove to," and with head up into the wind she rides the waves like a duck.

Finally the anxiously watched barometer begins to rise, the wind moderates and shifts, the sky begins to clear, and the seas, disappointed, baffled, and growling, subside. The vessel is headed up to her course, the timid sails begin to show themselves one at a time, and at last we are again on our way, watching the barometer and sky for indications of the next storm.

FIFTY-TWO DAYS OF GALE WHILE CIRCUMNAVIGATING THE ANTARCTIC

Lyttelton was reached on April 1, 1916, after 118 days at sea. The total distance from Lyttelton around to Lyttelton again was 17,084 miles, giving an average of 145 miles per day. During this period we had gales on 52 days, half of them reaching hurricane force.

We were passed by a continual procession of circular storms moving around the Antarctic Continent from west to east. Always with a decreasing atmospheric pressure, we would have northerly winds shifting to the northwest and blowing hard. As the pressure began to increase, the wind shifted to southwest, blowing a gale if the rise was rapid.

We had precipitation of some sort,

Photograph by William Reid

AFTER SHEARING IN WAIRARAPA COUNTY, NEW ZEALAND

Wairarapa, in the southern section of North Island, is known as "the county without a black sheep." The wool exports from New Zealand in a recent year exceeded 250,000,000 pounds.

Photograph by J. P. Ault

IMAGES OF GRIM AND SOLEMN ASPECT ON EASTER ISLAND (SEE TEXT, PAGE 654)

either mist, fog, light drizzle, rain, hail, or snow, on 100 out of the 118 days. Fog was present on 20 days and snow on 16 days, and over 135 icebergs were sighted.

The aurora australis, or south polar lights, were seen on 14 different occasions, some being unusually brilliant. They were generally in the shape of long streamers and pencils of white light, or great arches of white or green light stretching across the sky, but never displaying the variety of gorgeous colors seen in northern latitudes.

In spite of fog and storm, the sun or a star was seen every day, and the magnetic declination was observed on every day except one—a truly remarkable record in view of the extremely unfavorable climatic conditions.

Below the western part of Australia, at about 60 degrees south latitude, we found the magnetic declination, as shown on the nautical charts, to be 12 to 16 degrees in error, the largest difference found in any of the *Carnegie's* work.

THE GRACEFUL ALBATROSS BECOMES COMICAL ON SHIPBOARD

The wandering albatross (see illustrations, pages 659 and 666) was our daily companion throughout the southern cruise. Soaring about the vessel, now skimming the waves with the tips of his wings and now rising high above the masts, he never flapped his pinions. He seemed to delight to play in the cross-currents of wind in the lee of the sails, and as he hovered over the ship his curious eye seemed to observe every detail of life on board.

Many were caught with a baited triangle of metal trailed astern at the end of a long line. Their hooked beaks would catch in the corner of the triangle, and they would be hauled up uninjured. Once on board, they were allowed to walk about the deck freely, as they could not rise and fly away without a long run or "take off."

It was very comical to see them become seasick, due to the motion of the vessel, thrusting their beaks up into the air, groaning and snapping their bills, and trying to "feed the fishes" like regular land-lubbers. The largest measured 17 feet from tip to tip of wing.

Other birds seen were the molly-mawk, the sooty albatross, the Cape pigeon, the snowy petrel, the giant petrel, the skua gull, and the penguin.

Our stay at the next port, Pago Pago,

Photograph by William Reid

A TASMANIAN KANGAROO WITH YOUNG IN POUCH

The Tasmanian kangaroo is smaller than that found in Australia and is about the size of an ordinary sheep. Only one young one is produced at birth. The female carries it in a pouch until the offspring is able to run by the side of the parent, but retiring into the pouch in times of danger.

Tutuila Island, American Samoa, was very short and was featured by almost continuous entertaining by the American naval officers and their families stationed there. Before our arrival an interned steamer's cargo of bottled beer was rapidly being depleted by the popular daily swimming parties, until an order was issued forbidding swimmers to board vessels at anchor.

The harbor, located in the crater of an extinct volcano, is entirely surrounded by mountains whose slopes, richly covered by palms and tropical verdure, rise steeply from all sides, forming one of the safest and most beautiful harbors of the world.

The town containing the naval station is built upon a narrow strip of land on the shore of the harbor, with a background of heavy growths of bananas and coconut palms rising on the slope beyond. Rain is abundant, at times superabundant, and the water supply is piped into the town from a reservoir built high up in one of the mountain streams far back in the interior.

The Samoans are noted for the high character of their family and tribal relations. The people have been encouraged to retain their native customs, to live in their old-style houses, which have proved their adaptability to the climate, and as a result the Samoans are to-day the healthiest and most stalwart of all the Polynesians, and, unlike the Marquesans and the natives of other island groups, are not being rapidly depleted by the ailments of civilization.

The law is tempered to suit the mind of this simple-hearted people. The jailer and his charges close up the jail over the week-end and go home to visit their families. The government handles the copra crop for the natives, thus insuring them a fair profit for their labor.

Our party attended the wedding of a Samoan princess, and the principal guests were presented with mats and tapa cloths by the bride's father. An elaborate feast

Photograph from American Australian Bureau

FEEDING AN EMU IN THE NATIONAL PARK ON WILSON'S PROMONTORY, VICTORIA, AUSTRALIA

Next to the ostrich, the common emu is the largest of existing birds. Its nine to thirteen eggs are laid in a shallow pit scraped in the ground and are hatched by the cock-bird.

of roast pig, chicken, taro, breadfruit, sugar cane, and coconuts was spread before the guests, but the major part of it was eaten or carried home by the onlookers, who were invited in after the guests had departed.

"THE MYTHICAL ISLAND OF GUAM"

Guam used to be the mythical port for which vessels would clear when sailing under sealed orders with destination unknown.

When we told one of our New Zealand friends that we were sailing for Samoa and Guam, he thought we were joking. When assured that Guam was a real place, he apparently made inquiries among his friends, for the next day he said he had found out all about Guam; that it was an island covered with a 15-foot mantle of snow and ice. He was more puzzled than ever when we told him that Guam was one of the hottest tropical islands north of the Equator.

Far from being an island of mystery, Guam is a very important cable and naval station belonging to the United States since 1898.* But the typhoon season was beginning, and we soon sailed on again for San Francisco, being fortunate in getting safely out of the port of San Luis d'Apra, thickly dotted as it was with coral heads and reefs and open toward the heavy gales from the southwest.

A glimpse of the dear home land was very welcome, but after a month's stay in San Francisco the *Carnegie* was again on her way November 1, 1916, en route for Easter Island.

EASTER ISLAND, THE UNSOLVED MYSTERY OF THE PACIFIC

Easter Island, or Rapanui, is located in the eastern part of the South Pacific Ocean, about 1,400 miles east of Pitcairn and about 2,000 miles west of Chile. It contains about 50 square miles, and has been aptly described as a heap of stones and lava.

It has no harbors, no trees except a few fig trees, and no running water. Cisterns, wells, and a few springs of fresh water on the beach, uncovered at low tide and fed from the lakes in the extinct craters, furnish the water supply. Some of its volcanic peaks reach an altitude of 1,800 feet.

The climate is almost ideal, being moist and temperate, the southeast trade wind blowing for a major part of the year. Bananas, sugar cane, cotton, tobacco, sweet potatoes, melons, pumpkins, pineapples, corn, and tomatoes are grown in small quantities. More than three-fourths of the island is pasturage land, the rest being covered with broken lava.

The 200 natives are a mixed race, being of Polynesian descent, but in later years they have been much changed by mixture with white whalers and traders. There seems little organization among them, as they have no chiefs and all live in the same village as one large family.

The Chilean Governor, an old Frenchman and a Greek sailor, who is manager of the ranch, were the only white people on the island. The live stock consisted of 4,000 cattle, 8,000 sheep, and 400 horses. There are no exports except hides; every five years selected animals are killed for their hides and the meat is thrown away. The island belongs to Chile, but communication with the mainland is very irregular, a vessel being sent out usually once a year. However, often two years pass without new supplies.

When we arrived no ship had reached the island from Chile for more than a year and a half, and the general store contained only one tin of kerosene and six tins of sardines. Clothing of any description and soap were at a high premium. The requests for the latter finally became overwhelming, some women even coming to us with American or English gold in outstretched hands, begging for a cake.

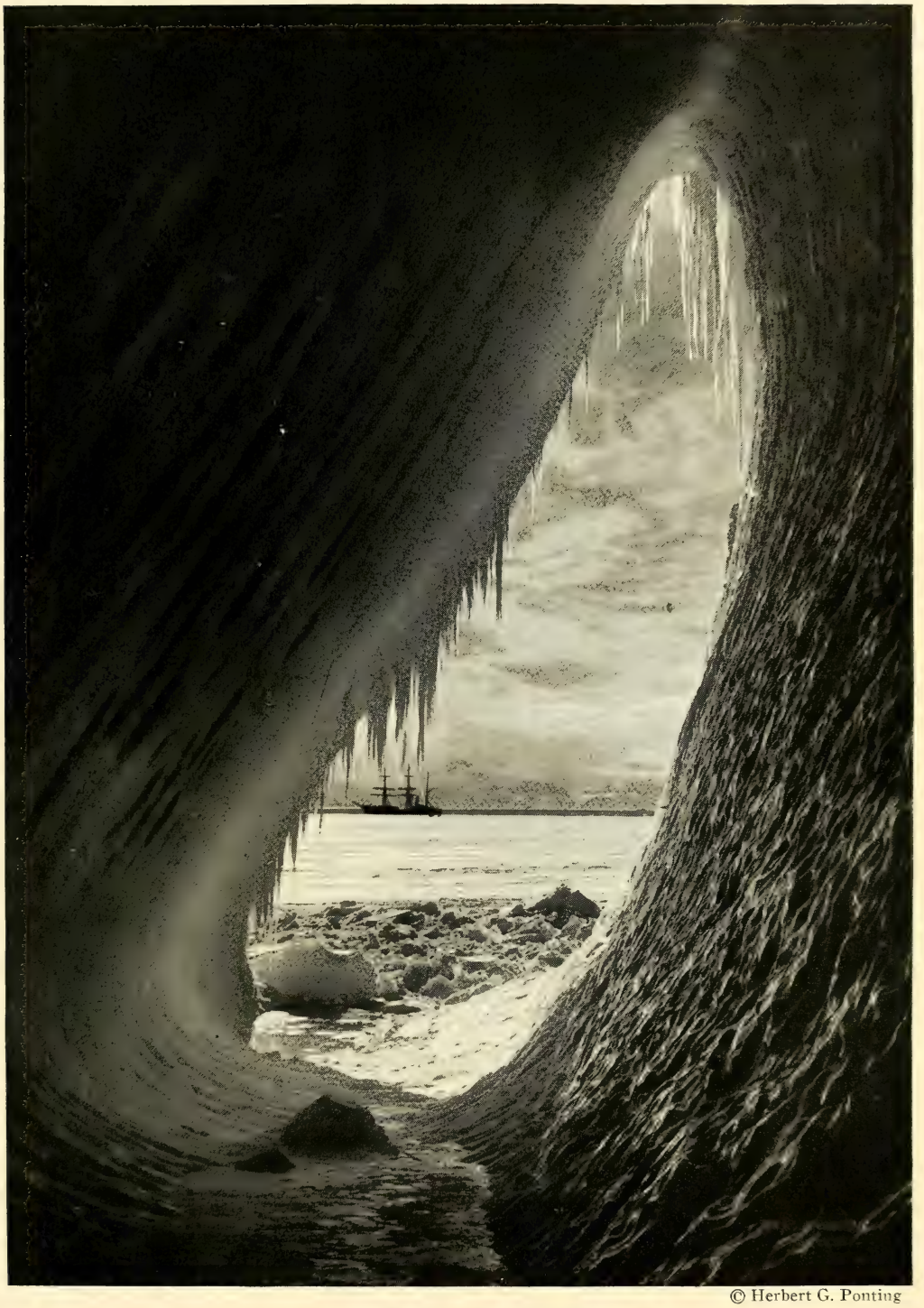
In order to satisfy as many needs as possible and as chickens were plentiful, though very small, a fair and satisfactory rate of exchange was finally adopted. All who had chickens could get soap at the rate of two chickens for one cake of this important article. We built a coop on the quarter-deck and had fried chicken for many weeks after leaving the island.

TRADING WITH THE NATIVES

Small images, made to imitate the huge statues for which the island is famous, and other curios were traded for any articles of clothing which could be spared. Some of the trades were: one good image for two pots of paint; one image not quite so old for one pair of old trousers; native carrying camera on horseback one day for one small piece of rope to tie his horse; one collection of ancient obsidian spear points and war hatchets for one old suit of clothes; one small collection of spear points for six cigarettes; one small image for one shirt, and the shirt must be that worn by the trader, as the native thus feels sure he is getting a good article. One man on board had to change shirts three times in an afternoon.

The islanders take great care of their boats, using them to obtain fish for food and to catch porpoises for the oil used in their lamps. A feature of the New Year's Day celebration was a boat-race. The entry of the crafty old Greek sailor reached the finish line nearly a quarter of

* See "Our Smallest Possession—Guam," by William E. Safford, in THE GEOGRAPHIC for May, 1905.



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A GROTTO IN AN ICEBERG

This unique study was made from the heart of an iceberg. The grotto was formed by a berg as it turned over, carrying up with it a large floe, which froze on to it, leaving this beautiful cavern, through which it was possible to walk for more than a hundred feet. By good fortune, at the time the artist reached this spot, the *Terra Nova* could be seen in the distance. This and the seven succeeding illustrations of Antarctic life are from photographs made by Herbert G. Ponting, the official photographer of the British Antarctic Expedition under Capt. Robert F. Scott.

© Herbert G. Ponting

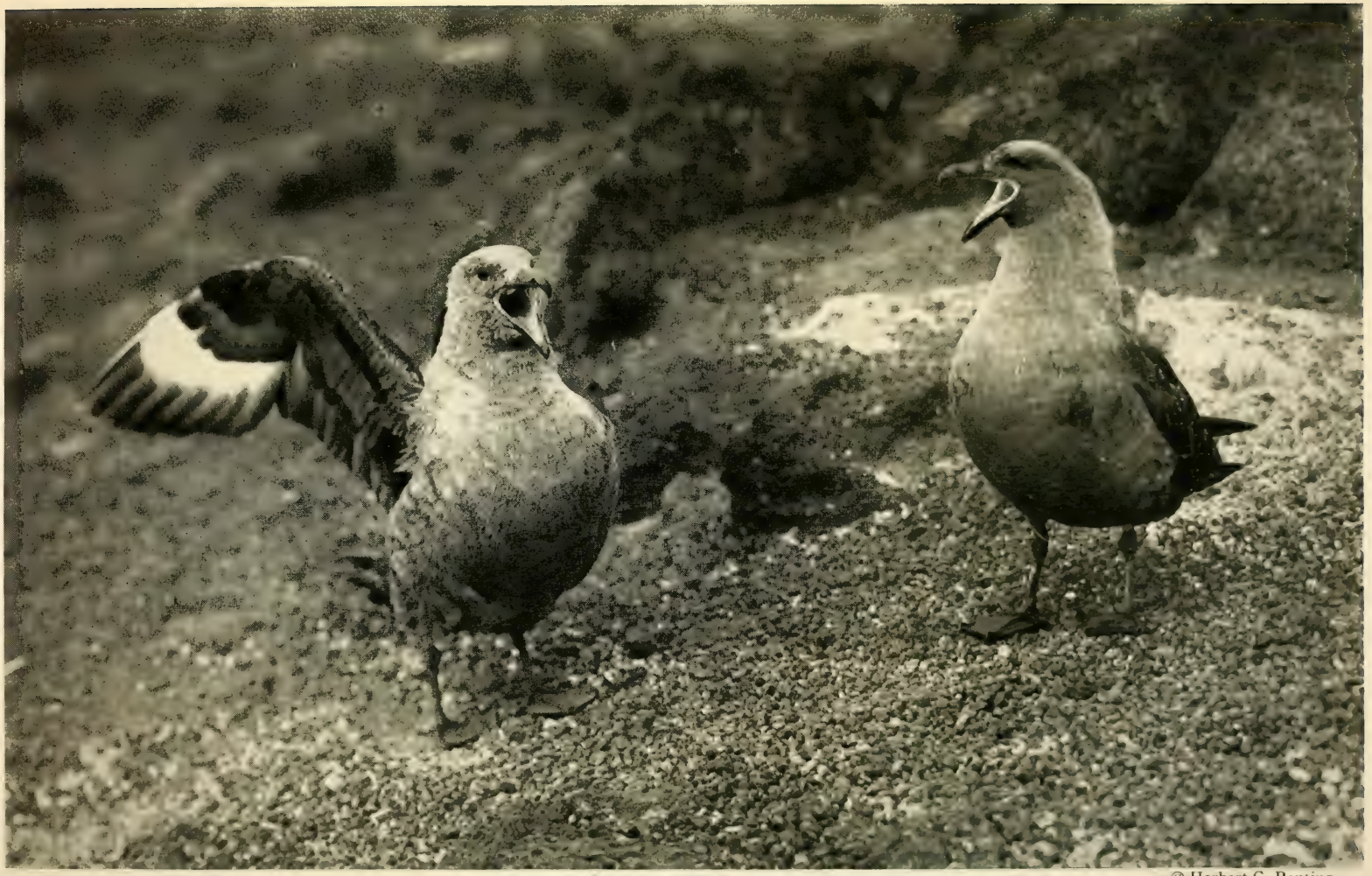
SEALS BASKING ON PANCAKE ICE

When the sea begins to freeze, small circular patches of ice form on the surface, no larger than a penny; these rapidly increase in size and become what are known as "pancakes." These pancakes in turn freeze together, becoming "floes."

© Herbert G. Ponting

THE MIDNIGHT SUN IN SOUTH POLAR SEAS

A "mackerel sky" through which the sun sheds feeble rays over McMurdo Sound, viewed from the ice-foot. McMurdo Sound separates South Victoria Land from Ross Island, on which rises Mt. Erebus (see South Polar Inset in the Map of the World).



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A SKUA GULL DUET

These rapacious birds are called "big pirate ships." They are the enemies of every living creature which they can master, and sometimes eat their own offspring.

© Herbert G. Ponting

ALBATROSSES FORAGING AT THE STERN OF A SHIP

The acme of grace and symmetry in the air, the albatross is a most ungainly looking creature when alighting on the water, with his big webbed feet straddled to their fullest extent. When rising, he stretches out his neck and with great flapping of wings runs along the top of the water for 70 or 80 feet, until he acquires sufficient momentum, then tucks his "landing gear" beneath him and is at home once more in the air.

© Herbert G. Ponting

A TABULAR BERG NEWLY "CALVED" AWAY FROM THE GREAT ICE BARRIER

The clean-cut line of the fracture where it broke away from the parent glacier shows that it has not been long subject to the erosive action of wind and water. The berg is about 100 feet high, and, as only about the eighth part is visible above water, there are some 700 feet of ice below the surface. In the distance the peaks of the Western Mountains can be seen. During its circumnavigation of the Antarctic, the *Carnegie* sighted more than 135 icebergs (see text, page 651).

© Herbert G. Ponting

KILLER WHALES RISING TO THE SURFACE FOR AIR

The killers are the most ferocious creatures inhabiting the seas. Though small for whales (from 20 to 30 feet in length), a pair have been known to attack and kill a sperm whale 70 feet in length.

© Herbert G. Ponting

"BLESS YOU, MY CHILDREN": A PENGUIN AND HER CHICKS

"Funny little creatures, half fish, half bird, and fairly human in their curiosity and comic actions" (see text, page 647). When a brooding penguin is driven from her nestlings she lingers near by, trumpeting loudly until the disturbance is over; then she returns and, stooping down, anxiously examines her treasures minutely, like a nearsighted person.

a mile ahead of his opponent. He attributed his success to having greased the bottom of his boat early that morning. The winner of the horse-race saw that he was being hard pressed by his rival on the home stretch, so he decreased the weight by loosening the girth and letting the saddle "go by the board" while galloping at full speed.

MYSTERIOUS STATUES, GRAVEYARDS, AND CAVE DWELLINGS OF AN ANCIENT RACE

Several trips on horseback were made to the eastern end of the island, a distance of about 12 miles from the anchorage in Cooks Bay, to see the huge statues scattered over the plain and up the slope of the image mountain, Rano Raraku. The impressive scene as we rode over the hill, and the images on the hillside across the valley came into view, will never be forgotten. With one accord we drew rein and gazed spellbound.

These huge statues, staring at us out of unseeing eyes, with somber, austere expressions and unsmiling lips, seemed almost human. As our imagination pictured the scene of a bygone day, with the valley and hillside alive with activity, we had a feeling that we were not alone. Yet their silence remained unbroken, giving no hint of the secrets which they have been guarding for centuries.*

Digging into the graves at the foot of the large image platform near Rano Raraku, we found numerous skulls with curious geometric designs carved on the foreheads, indicating that they had been chiefs. One skull was unearthed having a fully formed tooth projecting upward into the center of the nose. The jaws seemed to be normal in shape and to have the usual number of teeth in normal position.

In another part of the island are the remains of stone houses or caves built into the hillside, partly underground, in a remarkable state of preservation, some being 100 feet long by 20 feet wide, with walls five feet thick and five feet high. They are very skillfully built of large flat stones laid in courses and fitted together in the manner of roof tiles, the rooms being lined on the inside with upright slabs on which are painted hieroglyphic figures representing birds and animals. The doorway is quite low, the dweller being compelled to enter on hands and knees. The lava rocks near these cave houses are curiously carved into resemblances of various animals with bird heads.

The Governor detailed for us an interesting tradition of the bird cult of these ancient peoples. It differs somewhat from other versions, but refers to a ceremony carried out annually in former times.

The people who lived in these cavelike homes and who made the carvings on the rocks seemed to have worshiped a certain sea bird.

Every spring the men who wished to rule the tribe were contestants in a peculiar race. About one-half mile from the southwest point of the main island is a small island, known as Motu Iti, or Needle Rock, about 100 feet high, with very steep sides. The one who swam across the channel, climbed to the top of this rock, secured the first egg laid by this sacred bird, and returned safely ahead of his competitors, was chosen to be chief for the ensuing year.

Frequently many lives were lost in the heavy surf. A big feast and pageant celebrated the election, and the eggs obtained by the successful contenders were preserved in the temple.

CHRISTMAS DINNER ON EASTER ISLAND

Rats and a species of quail or grouse were numerous on the island. The quail are usually hunted with dogs, who locate them in the grass, and the birds are then killed with a stone accurately thrown. The Governor's native servant, a boy of fifteen, called Indio, brought in some two dozen birds in about one hour by this method of hunting, and we had fresh quail for our Christmas dinner ashore.

The natives all speak Spanish in addition to their own native language. They gather around the Governor's house when strangers are there, watching everything, the windows and doors being full of faces. All seem good-natured and care-free.

When the Governor was through with the cigarette which had been given him, he would pass it on to his chief assistant,

*For detailed descriptions of these images and speculations on their origin, see "The Mystery of Easter Island," by Mrs. Scoresby Routledge, in THE GEOGRAPHIC for December, 1921.

Photograph by American Australian Bureau

"THE GOLDEN MILE," KALGOORLIE GOLD FIELDS, WESTERN AUSTRALIA

Western Australia, like the western United States, owes much of its progress to the discovery of gold. The Kalgoorlie gold fields, discovered in 1893, support 15,000 miners to-day (see text, page 674).

who would take one or two puffs and in turn pass it on to his wife and family, until it was really finished.

We took the Governor's letters and posted them at Buenos Aires, but not one of the various letters left at Easter Island by our party, to be mailed on the next vessel to call, has ever reached its destination. Perhaps they were lost before the arrival of the next steamer, which came about six months later, or the valuable Rapanui stamps may have proved too great an attraction if the letters passed through the mail.

From Easter Island the *Carnegie* proceeded around Cape Horn once more and reached Buenos Aires March 2, 1917. As we had sailed from the United States before the presidential election the previous November, we did not know that President Wilson had been reëlected until we arrived in Argentina.

Owing to the entry of the United States into the war, it was deemed best to detain the vessel there until December, when she began her return trip to Washington, going back around Cape Horn, through the Pacific Ocean and Panama Canal, reaching Washington in June, 1918.

Owing to special duties during the war assigned to the Department of Terrestrial Magnetism, plans for future ocean work were not made until after the close of 1918, and the *Carnegie* remained at Washington, out of commission, until preparations for Cruise VI were begun, in 1919.

NUMEROUS BIRDS BOARD THE VESSEL AT SEA

In October the vessel sailed for Dakar, Senegal, French West Africa. Storms and rain squalls, regular Gulf Stream weather, attended us all the way across the North Atlantic to the Azores.

During this trip a British steamship came out of her course to have a look at us, saluted us with three blasts of the whistle and by dipping her flag, courtesies to which we replied in kind.

We had better weather after leaving the Azores, and during the calms we amused ourselves by dipping up some of the sargasso seaweed from the surface of the water. We would find many small, highly colored crabs, about the size of one's little finger nail, and tiny shrimp hiding in the weed.

Frequently small birds would fall on deck exhausted, having been blown hundreds of miles to sea ahead of some storm. After resting and being given water and food, they would usually fly away again.

A large owl tried his best to land on the deck one stormy day, but was very timid and hesitant because of the people. He would first fly along on the port side and then he would try the other side, frequently becoming drenched by the waves, which also were trying to come on board. At last he flew too far forward, into the down draft to the lee of the foresail, and was blown into the water in front of a huge wave, and disappeared.

Whales were often seen and at times would sport and play about the bow of the vessel, apparently wishing to be neighborly, handling their huge bulk with quick and graceful ease. We overtook one just as he was blowing, and his surprise at our presence and nearness was so great that with a mighty splash he sounded. If he kept up his speed and direction he never stopped until he struck bottom.

A "HARMATTAN" OFF THE COAST OF AFRICA

When more than 120 miles from the African coast, we met a *harmattan,* or sandstorm. The hot easterly winds blowing across the Sahara Desert carry fine particles of red sand far out to sea, filling the air and covering the sails and rigging of the ship with a coat of fine red dust. Moisture collects about each particle, forming a dense fog; the sun cannot be seen until it reaches an altitude of 15 degrees or more, and the horizon is not more than half a mile distant.

Under these conditions the navigator must measure the altitude of the sun from a position as near the surface of the sea as possible, correcting for the nearness of the horizon.

For four days we were sailing through this harmattan, yet we picked up soundings off Cape Verde precisely as expected.

After we had remained "hove to" for 24 hours on account of the fog, the weather cleared for a few hours in the morning, long enough to permit us to make port.

Owing to the presence of bubonic plague in Dakar, 12 deaths occurring daily among the native population, it was con-

Photograph by W. J. Peters

ARGUMENTATIVE ALBATROSSES ON THE DECK OF THE "CARNEGIE"

When captured with hook and line (see text, page 651) and hauled on board, these great birds were prisoners, although never fettered or wing-clipped. They had not sufficient space in which to get the necessary running start preparatory to taking the air. One of the oddities of their life on shipboard was their susceptibility to seasickness, caused by the rolling motion of the vessel.

sidered inadvisable to remain there long enough to carry out any shore work.

The chief article of export from Dakar seemed to be the groundnut, or small peanut, thousands of tons of this oil-producing product being stacked up in the open awaiting shipment to France.

After taking on fresh water and supplies, the *Carnegie* sailed away for Buenos Aires after a short stay of four days.

Skirting the coast of Liberia, we passed within a mile of Cape Palmas and had a good view of the 1919 eclipse station. Sailing on eastward past the Gold Coast, we soon headed south off the Bight of Benin, across the Gulf of Guinea, to pick up the southeast trade wind, after which we had a direct run for Buenos Aires.

TAKING OBSERVATIONS BY STARS AND LIGHTNING

For two nights before entering the River Plate (Rio de la Plata), we were visited by heavy winds and rainstorms from the southwest, called *tempesturas,* frequently met with off the Argentine coast. No sails could be set, and the vessel was driven helplessly in a torrential rainfall, with the wind seeming to shift about in all directions. After a few hours the storm passed to the eastward, and the western sky and horizon cleared.

As we were due to make a landfall the next morning, it was important that we obtain our position that night, in order to steer the proper course for the entrance to the river. Accordingly, observations on two stars were taken and our position was determined at about 1 o'clock in the morning of a dark, moonless night, altitudes being measured when the western horizon was illuminated momentarily by the lightning flashes from the storm receding toward the east.

With the sextant we would "bring the star down" to the point where we assumed the horizon to be, wait for a flash of lightning, and then make a quick setting or measurement of the altitude when the flash came.

Buenos Aires is the Paris of South America, and at carnival time it is a riot of life, color, and gayety. We will not tarry here to add anything to the many descriptions which have already been written of the Argentine capital,* but hurry on to some of the more inaccessible places.

Photograph by J. P. Ault

MAKING THE JIBS FAST IN HEAVY WEATHER

ST. HELENA, WHERE NAPOLEON WAS EXILED AND DIED

En route for St. Helena we met some of our iceberg companions of farther south and passed near Gough Island, that lonely, uninhabited spot in the middle of the South Atlantic Ocean which seems to be one of the homes and breeding places of the wandering albatross.

These regal wanderers along the ocean air lanes seem to care nothing for distance, for we have met them and have had their company in all our cruises in the oceans south of the Equator, no matter how far from land.

As one approaches St. Helena, it seems a barren, unattractive pile of lofty mountains, divided by deep valleys, with its seemingly inaccessible coast-line guarded by cliffs 600 to 1,200 feet in height, giving no glimpse of the beautiful woodlands and green meadows of the upper plateaus.

The harbor at Jamestown is an open roadstead facing the north, and the town is picturesquely located in the narrow valley that makes its way down to the sea between huge masses of overhanging rocks.

Automobiles are not allowed in St. Helena; so, taking horse carriages, we were soon wending our way leisurely up the winding road leading to Longwood Plain, and the view of the town and fertile valley below became increasingly wonderful as we went higher.

In the center of this plain, some 1,800 feet above sea-level, in the midst of pleasing rural scenery, is Longwood House, where Napoleon lived and died. It is a rambling frame structure of about 35 rooms. It is without a single piece of furniture, except that in the front room there is a bust of Napoleon, mounted on a pedestal, to mark the spot where he died.

He was laid to rest in a beautiful shady glen, surrounded with cypresses and lofty Norfolk pines, near a cool spring, where

* See "Buenos Aires and Its River of Silver," by William R. Barbour, in THE GEOGRAPHIC for October, 1921.

Photograph from Sir Douglas Mawson

ROYAL PENGUINS ON THE BEACH AT MACQUARIE ISLAND, IN THE ANTARCTIC

It is the Royal species of penguin which is killed chiefly by sealers for oil, not because it is fatter than the King, the Emperor, or the Victoria species, but because it lives in larger colonies. One rookery on Macquarie Island occupies an area of more than 16 acres. It is estimated that 150,000 birds are slaughtered annually, but they are constantly increasing in numbers.

he was wont to spend many leisure hours, either alone or in the company of his favorite companion, a nine-year-old child, daughter of a sergeant of the garrison.

Near the grave is the residence of the French consul, whose duties include the care and protection of this burial place, where Napoleon's body remained for nearly 20 years before being removed to France.

As we climb out of the valley and reach the crest of the ridge which stretches across the middle of the island, the continuous cool southeast trade wind reaches a force which turns the branches of the trees backward upon themselves, none being able to grow to windward against the pressure of the breeze.

The view toward the sea, south across Sandy Bay, that huge basin of an extinct crater, is a picture of desolate grandeur, with enormous gorges amidst tumbled masses of rock. The isolated peaks of Lot and Lot's Wife stand out against the western sky.

The chief industries of the island are lace-making and the production of hemp from a species of New Zealand flax. The people were formerly poverty-stricken, there being very little profit in anything that they raised, since there was no local market. This led to the introduction of lace-making, men, women, and children being taught the industry. St. Helena lace has a splendid reputation for pattern and quality.

CAPE TOWN, ONE OF THE WONDER PLACES OF THE WORLD

Our visit to Cape Town emphasized, perhaps more strongly than at any other place, how little we know of a country or of its people before we see them at first hand.

Africa has often been thought a land remote, mysterious, and inaccessible, but Cape Town might well have been a city in our own country and its people our own countrymen, except that very few of our cities could compare with it in its beautiful and unique setting. It nestles in the shadow of Table Mountain, a broad, flat-topped pile of rock with almost perpendicular sides, towering to a height of 3,600 feet and flanked on either side by two conical peaks.

Climbing up the winding road back of the city leading to the mountain top, in the midst of the beautiful silver-leaf trees for which Cape Town is famous, and viewing the town spread out in panorama at our feet with the harbor and crescent-shaped bay beyond, we could not fail to class it as one of the wonder places of the world.

Motoring to the Cape of Good Hope, we passed through fertile valleys, clothed with fruit trees and immense vineyards, where some of the finest fruit in the world is grown.

Standing on the high bluff of the cape, we could look westward over the South Atlantic, southward over the Southern Ocean, and eastward toward the Indian Ocean, and, having in mind the storms which we had met and the ones yet in prospect on these turbulent seas, our thought was that the best place to see the sea is from the shore (see page 673).

The famous summer resort and bathing beach of South Africa at Muizenberg was deserted, at the time we were there, in May, during the winter season of the Southern Hemisphere. There can be no place so dreary as a deserted popular beach, which in season is teeming with pleasure-seekers, but now full of empty spaces and dead seaweed.

As the English and the Dutch are almost equal in number, two languages must be used in all official documents in this province, evident everywhere on road and railway signs and on public bulletin-boards.

We motored to Stellenbosch, with its quaint buildings, the original settlement of the earliest European colonists, French Huguenots. No rain had fallen for several months and a water famine was feared; otherwise the climate reminded us of southern California.

CEYLON, THE GATEWAY TO THE EAST

Our first impression upon landing at Colombo, chief seaport of Ceylon, after our long trip up through the Indian Ocean, was that India is surely sweltering in humanity. This seemed another world, the contrast between the life of the old East and of our own Western civilization being so great.

Here the manner of living has not changed for centuries and perhaps will remain much the same for centuries to

Photograph by Emil P. Albrecht

A STREET SCENE IN PONTA DELGADA, CHIEF PORT OF THE AZORES

There are no thrilling attractions to hold one long in Ponta Delgada, yet there is more to be seen than one can get in a hasty drive. Picturesque old buildings line the clean, well-kept streets.

come. However, the taxicab is trying to replace the old familiar jinriksha, and European and American business firms are increasing in number, due to the demand for the conveniences and luxuries of the Western Hemisphere.

Our glimpse of the interior of Ceylon at Kandy, with its wonderful Temple of the Tooth, its beautiful and famous Peradeniya Gardens, and its historical places of mystic origin, was all too brief.

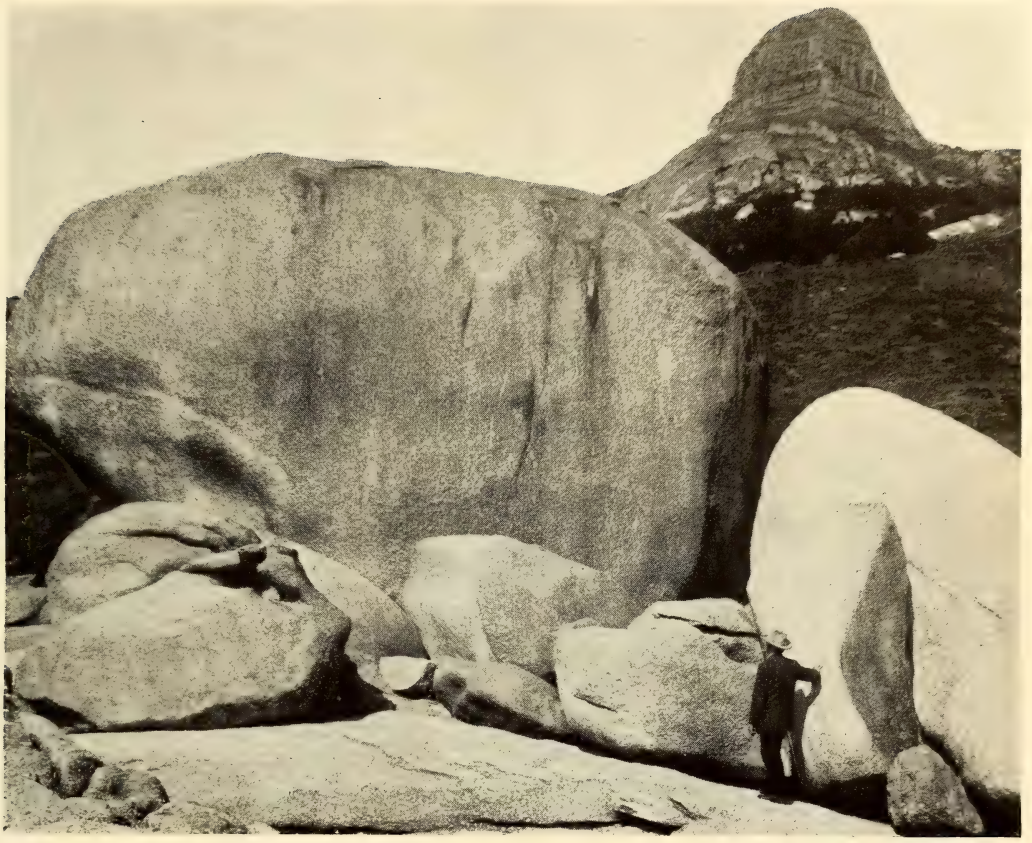
The Hindu boy, using his elephants to haul brush and logs in clearing off a bit of land, spied our automobile coming along the country road. His elephants immediately dropped their burdens at a word from their master and hurried down to the roadside to pick up a few rupees by performing for the foreign visitors.

At Kandy we saw something of the eastern art industries, where exquisite articles of pottery and of beaten brassware are made by hand.

Much to our regret, our time in this fascinating country was too short to include a visit to the ancient capital of Anuradhapura, of mystic origin, surrounded with ruins of images and of ancient temples, of cities, and of gigantic irrigation works.

At Galle, ancient emporium of trade with the East, on the southwest point of Ceylon, we saw the natives cutting, grinding, and polishing rubies, emeralds, sapphires, and other precious stones. They used century-old methods, and manufactured with patient skill beautiful articles of lace and of tortoise shell.

At Kalutara we paused to witness a curious religious procession similar to the Kandy Perahera, a night procession of priests and of sacred elephants, which has been held annually for more than 2,000 years. There were grotesque floats, with huge images of birds and beasts, and sacred elephants caparisoned in trappings of silk and gold. Borne in the midst was the image of Buddha sitting upon the coiled body of a bronze cobra and sheltered under its uplifted, hooded head.



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THE LION'S HEAD FROM LOVERS ROCK AT SEAPOINT: CAPE TOWN, UNION OF SOUTH AFRICA

Living at the Galle Face Hotel, listening to the ceaseless roar of the waves dashing upon the sand, with the monsoon blowing steadily from the southwest, we were much interested in the life about us.

The men, with their curious dress, long hair coiled up on the top of the head and crowned by a semicircular comb of tortoise shell, seemed almost effeminate.

Sitting near the window of the hotel room, having tea and toast in the early morning, one must keep watch on the bold ravens or his toast will disappear if his back is turned for a moment.

The climate can be described as moist and hot, but tempered by cool sea breezes on the coast, the European being under the necessity of protecting the head from the rays of the sun, while the native goes bareheaded and apparently pays no attention to the heat.

The Europeans are fortunate in having a cool mountain resort in the interior at Nuwara Eliya, within a few hours' train travel, where they may find relief from the heat of the coast.

MAGNETIC NEEDLE SETTLES LAWSUIT

The practical side of our work was emphasized at Colombo. There was a case being tried in court involving the location of a boundary line, and the claimant insisted that the line should be relocated according to the compass variation which existed when the first survey was made. The defendant argued that the compass variation had changed in the interim.

Since we were now repeating our observations at exactly the same spot in the observatory grounds at which we had observed in 1911, we were called upon to furnish our data showing the change which had taken place during the intervening years.

As soon as we had completed our observations and computations, the data

Photograph from South African Railways

CAPE TOWN AND TABLE MOUNTAIN, SOUTH AFRICA

Nestling at the foot of a perpendicular pile of rock which rises to a height of nearly 3,600 feet, the capital of the Province of the Cape of Good Hope, Union of South Africa, is one of the most picturesquely situated cities in the world. It has a mean annual temperature similar to that of Nice and the Riviera.

Photograph from South African Railways

THE CAPE OF GOOD HOPE

There are a few spots on the Earth's surface whose very names conjure up mental pictures of romance, of adventure, and of high endeavor. The "North Pole," the "South Pole," "Cape Horn," and the "Cape of Good Hope" are among these. History tells us that when Bartholomeu Diaz returned to Portugal after reaching this, the southwestern extremity of Africa, he gave it the name of the "Cape of Storms," but his Portuguese monarch, King John, was too clever a publicity man to handicap the discovery with such a title; he changed it to the "Cape of Good Hope."

Photograph by M. L. Patterson

PORPOISES AT PLAY OFF THE COAST OF ARABIA, NEAR SOCOTRA

(For an account of Socotra, the unique island from which the world gets its frankincense, see THE GEOGRAPHIC for March, 1918.)

were taken to the surveyor general for the information of the court. The greatest annual change in the compass pointing was found in the South Indian Ocean, where it amounted to as much as 21 minutes per year.

WESTERN AUSTRALIA RESEMBLES WESTERN UNITED STATES IN PIONEER DAYS

Our visit to Western Australia reminded us of our own western United States in the early days. This is a new country, the active settlement dating back to the discovery of gold in 1885, but agriculture was not begun to any extent until 1903 and 1904.

The history of Australia thus resembles that of the United States. Settled first in the east, the west, reached only by water routes, was little known until the discovery of gold caused a rush of settlers and prompted the building of a transcontinental railroad.

We were impressed with the beauty and profusion of the wild flowers, all of which were unknown to us in the United States. These included the wattle, which blooms in many varieties; the fragrant baronia, the red and green kangaroo paw, the many different kinds of orchids, the wax flower, and the everlastings, which mantle the country for miles at a stretch.

The interior of Australia contains no mountain ranges of any size, has no watershed, and until the water supply problem is solved, this part of the country will remain practically nonproductive. Thus, at the famous Kalgoorlie gold mines, two cities, with their thousands of people, are dependent for their water upon a supply pumped up from a reservoir near the coast, at Perth, through steel pipes, over a distance of about 350 miles.

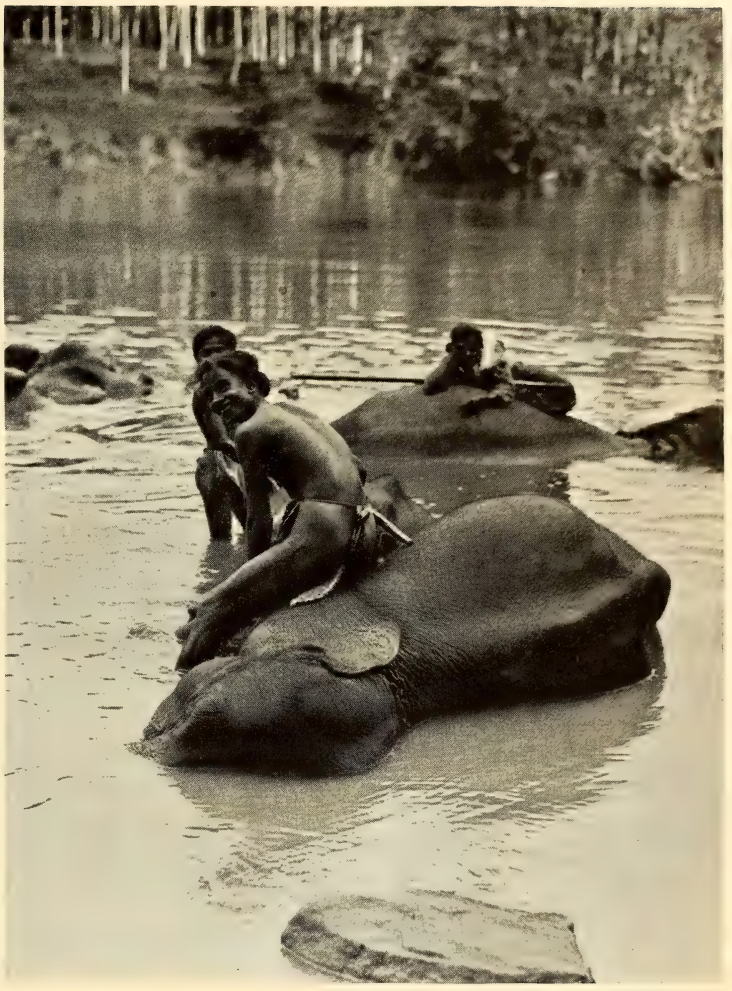
We visited the magnetic observatory of the Department of Terrestrial Magnetism at Watheroo, in the midst of a sandy plain, where the emu, the kangaroo, and the wallaby roam at will.

Wandering over this sandy waste, in the midst of scrubby trees and bushes, trying to shoot the swiftly moving kangaroo, we would pause in wonder at the beautiful orchids smiling up from the sand at our feet.

The kangaroo is difficult game for the hunter on foot, as he travels rapidly and offers a target only when he appears above the bushes at the top of his leap. The usual method is to hunt him with dogs and on horseback.

We visited the hardwood lumber industry in the huge gum and jarrah forests along the coast and saw something of the fruit-growing and farming regions.

The annual rainfall, 90 per cent of which comes in the winter months — from April to October — ranges from 40 inches along the coast to less than ten inches in the interior, diminishing rather regularly from the coast inland. Yet with a rainfall of only ten inches, equally distributed from May to October, enormous crops of wheat are grown with profit, and the acreage planted in grain is increasing rapidly.



Photograph by Maynard Owen Williams

CEYLON ELEPHANTS BEING GIVEN THEIR DAILY BATH

These beasts of burden require careful treatment to prevent their hide from cracking and chafing. They are scrubbed daily with cocoanut husks and water.

On leaving this democratic country, where the people were extremely cordial and unusually interested in our work, we felt that, while the progress of Western Australia as an agricultural country has been rapid, in view of the brief 16 years of intensive activity, yet its possibilities have scarcely been touched, and it is destined to become one of the great countries of the world.*

Cape Leeuwin maintained its reputation as a stormy and dangerous region. For 12 hours we were skirting this circular coast too near for comfort, in a heavy southwest gale, with high seas running, and the wind hauling ahead slowly during the day, just sufficient to keep the vessel within a dangerous distance from shore.

Thirty minutes after we finally cleared the rocks off the cape and were out in the open Southern Ocean, the gale died out to a calm, as though baffled of its prey.

Royal Company Islands, formerly reported as existing at latitude 50 degrees south, below the eastern end of Australia, have joined that numerous company of lost islands of the sea. We passed over

* See, also, "Lonely Australia, the Unique Continent," by Herbert E. Gregory, in THE GEOGRAPHIC for December, 1916.

Photograph from Plâté's Photographic Trade House

THE ANNUAL PERAHERA, OR BUDDHIST FESTIVAL OF CEYLON

Through the streets of Kandy and earlier capitals, the holy tooth of Buddha has been carried on the back of the finest elephant in the temple stables every year for twenty centuries. Until recently, the procession was always held at night, with lights from thousands of flickering torches cast upon the glistening features of the devil dancers and the rich trappings of the sacred beasts.

their reported position, but could see no signs of land.

Calling at New Zealand before beginning our year's work in the Pacific Ocean, we enjoyed meeting again our friends at Lyttelton and at Christchurch.

Proceeding up through the Pacific, we stopped for a few days at Papeete, Tahiti, Society Islands, where we spent Christmas and New Year's, 1920-1921. Much has been written about this mystic isle of the tropics, with its generous, open-hearted people, its wonderful tropical scenery, its lofty mountain minarets, green-clad to the summits, an island which seems to be the mecca of artists, authors, and poets, of scientists, bird men, bug men, and ne'er-do-wells.

Proceeding northward, we decided to call at San Francisco for repairs and recalking, as the vessel was leaking considerably. The route passed near Fanning Island, a coral atoll, where we stopped for a few hours to send cablegrams.

THE ROBBER CRAB CLIMBS TREES AND GATHERS COCONUTS

We recalled our visit here in 1905 and 1906, when we first saw the coconut or robber crab, known locally as the Fanning Island flea, brilliantly colored with mottled red, with a spread of 24 inches between the tips of its claws and a body 12 inches long. It lives on coconuts and climbs the trees to sever the stems, allowing the nuts to fall to the ground, some 40 feet below. It then descends the tree, and with its powerful claws slowly tears the husk from the nut until the shell is exposed at the end where the three holes occur.

Breaking the shell with a few quick blows of the heavy claw, it is soon enjoying a feast of the luscious white meat of the nut.

The natives often hunt the crab by weaving an obstruction of palm leaves around the tree trunk about 20 feet from the ground. As the crab backs down the tree and comes in contact with the obstruction, it lets go its hold, as if the ground had been reached, and is crippled or killed by the fall.

Some of these crabs were brought on board, but the barefoot sailors objected to their being allowed the freedom of the deck.

Fanning Island is nowhere more than eight feet above sea-level, and each of the 25 or 30 English cable operators living there has his coconut tree picked out as a refuge in case a tidal wave or heavy storm should visit the island.

DESERTED LAYSAN ISLAND RECHARTED

Sailing northward, we passed within half a mile of Laysan Island, in the western Hawaiian group. This is a small sandy island, noted in the public press a number of years ago because of the slaughter of the sea birds which make it their home.

No one was on the island when we passed. The sand was heaped up to a height of 50 feet at one place and there were only two trees and a few low bushes growing. The island appeared as a thin white streak on the horizon when first sighted. We had been expecting to sight land for about an hour before it appeared, so we knew that it was wrongly charted. By careful observations, we found it to be about four miles north of its assumed position.

Our route called for a swing up into the North Pacific Ocean before turning eastward for San Francisco, and, as it was winter time, we found stormy weather awaiting us.

HURRICANE TEARS SMALL SAILS TO RIBBONS

The vessel was leaking so badly now that very few sails could be set if a heavy sea was running. While hove to in a strong gale about 300 miles off San Francisco, the center of the storm passed over us and for about five minutes the wind blew with hurricane force. The vessel trembled and shook as if some giant hand were trying to thrust her down beneath the mountainous seas which were tumbling upon her decks, and with a terrific explosion both the small sails which were set were torn to ribbons.

After the necessary repairs had been made at San Francisco, we were soon on our way to the Hawaiian Islands, where we spent some time.*

One of the most interesting experiences during a trip through the South Pacific

* An entire number of THE GEOGRAPHIC, with many illustrations in color, will be devoted to the Hawaiian Islands in the near future.

Photograph by Dr. Edward Burton MacDowell

ENTRANCE TO PAGO PAGO HARBOR, U. S. NAVAL BASE IN THE SAMOAN ISLANDS

This harbor on the island of Tutuila occupies the crater of an extinct volcano and is one-and-a-half miles in length and three-quarters of a mile wide. The entrance from the sea is a very narrow channel.

Ocean is a call at an out-of-the-way coral atoll, a circular strip of white sand and coral about a quarter of a mile wide and ten feet high, surrounding a lagoon of quiet water. When first sighted, it appears as a long, dark fringe on the skyline, but as we draw nearer this fringe grows larger and higher, until it resolves into a grove of coconut trees apparently growing up out of the sea.

Making for the opening into the lagoon, we are accompanied by a continuous procession of huge waves, with smoking crests, marching upon the shore, and we hear the ceaseless roar of the surf as it pounds upon the fringing reef.

A PICTURE OF PLACID LIFE ON PENRHYN ISLAND

We find the native living in his thatched hut, nestling beneath the dreamy fronds of the coconut palms as they murmur ceaselessly in the warm caress of the tropic trade wind.

Photograph by Dr. Edward Burton MacDowell

BANANA STOMACHS IN SAMOA

This seems a page from romance, a paradise of climate, a place dreamed of but seen by few, a memory to soothe one's troubled spirit for years, a place where thoughts may wander from the strenuous life in the midst of rushing civilization.

Such a place was Penrhyn Island (Tongareva), one of the northern islands included in the Cook group, which we visited for a few hours one day in June, while en route from Honolulu to Samoa. Rarely do they see a vessel other than the trading schooner, the *Tiare Taporo,* which calls every six or eight weeks and which was then in port.

The island is about 12 miles long by seven miles wide, yet the narrow, circular strip of land surrounding the lagoon supports 400 natives. Eight white men were living there, engaged in trading or as government officials.

As soon as the *Carnegie* approached the island, one of the traders was able to recognize her, explaining that one of the two or three magazines to reach the island the previous year had described the vessel and her work and had shown her picture. The magazine had been re-read several times, and he had puzzled greatly over the absence of iron in the *Carnegie's* construction, being especially curious as to how an engine could be built mostly of bronze and copper.

After the magazine was finally discarded, and when searching for some paper with which to wrap articles sold to the natives, the pages describing the *Carnegie* showed up again. Then one Sunday morning this vessel, of all the ships of the sea which might have visited the island, comes gliding smoothly up to the entrance to the lagoon, with all sails set, like a huge white swan!

TRAGEDIES IN THE SOUTH SEAS

Going ashore for lunch, we were treated to fresh eels, fresh roast pork, string beans, fresh shrimp salad, and Rarotonga oranges. Then we wandered around the village and along the shore, saw the little church where all the natives were attending services, and visited the unique graveyard, with all the graves whitewashed to keep out the evil spirits.

One of the graves was very elaborately built with a huge canopy over the top like a bed, surrounded by an ornamental iron fence and the whole inclosed with an Eng-

Photograph by Dr. Edward Burton MacDowell

A SOLITARY FIGURE ON THE STRAND NEAR POINT VENUS, TAHITI

lish hedge. At the foot of the grave was a glass jar containing pieces of cloth, with needle and thread, so that the sleeper would be able to make his own garments when he awakes.

In contrast to this well-kept, elaborately decorated grave was one in another part of the cemetery, with a plain headstone marked "R. F. 1882." Yet beneath that simple epitaph lies hidden the tragedy of one poor woman's life.

A white woman of gentle birth and refinement, whose husband died of consumption, was left without friends or relatives and with no means of livelihood. She was forced to marry a native. This meant loss of caste and virtual burial alive; so she wished to guard her degradation from public gaze, even after death, and at her request this simple inscription was placed over her grave.

The resident agent of the New Zealand Government had been at Penrhyn for over 33 years. He was a sailor on a vessel which was wrecked on the reef outside the lagoon one midnight, as she was sailing along peacefully with a steady breeze and no thought of danger ahead.

He was in the first boat launched, as was also the captain's wife. The boat

Photograph by Dr. Edward Burton MacDowell

SURF BATHING HAS ITS DELIGHTS FOR MAN AND BEAST IN TAHITI

was overturned in the surf as they tried to get through the breakers to shore, and he was the sole survivor, clinging to the keel of the boat when it finally drifted onto the beach the next morning. He could not swim, as is so often the case with deep-water sailormen.

Here we also met a gray-bearded half-caste, one of the sons of the founder of the colony on Palmerston Island. Years ago the father, with his three wives, journeyed to this isolated paradise in the Pacific, and now there are more than 100 direct descendants living in the colony.

Three days later we called at Manahiki Island, less than 400 miles distant from Penrhyn, yet the people are quite different. The white buildings, with their red roofs, stood out in sharp contrast to the green of the coconut palm grove background, as seen from the open roadstead.

The resident agent came out to meet us in his small, shallow boat, with a huge black and yellow flag flying at the stern. The flag had no particular significance, he said, but some skipper had given it to him and he thought it looked fine. He said it was a Scotch flag!

After we had entertained the agent, his son, and one of the traders at luncheon,

Photograph by Dr. Edward Burton MacDowell

THE TAUPO'S MAID OF HONOR AND WAITING MAID, 13 AND 14 YEARS OLD, RESPECTIVELY

The Samoan *taupo,* or village maiden, is indispensable to the village chief. To her belong such traditional duties as leading the official dances and looking after the comfort and entertainment of distinguished visitors. She lives in a house of her own and is attended by several handmaidens, chosen for their beautiful faces and figures and ability to dance.

Photograph by Dr. Edward Burton MacDowell

DRYING VANILLA PODS IN TAHITI

we went ashore, first sending one of the native boats ahead to start fishing operations, as we had expressed a desire for some fresh fish.

On the way we passed two natives fishing from a canoe. One remains in the canoe while the other dives. After he gets down a few feet, he spits out his mouthful of bait and, holding his hook on a short line among the fish, which immediately come in large numbers for the bait, he suddenly jerks the line, snags a fish, and then brings it up to the canoe. Other fishermen went along the shore and with small spears and nets caught a string of fish for us.

The natives were all at the landing place to meet the strangers and were eager to have their pictures taken.

FOOD SHORTAGE AT MANAHIKI

The trading schooner had not paid the island a visit for more than six months, and the natives were short of food. They wanted flour most of all, and we noticed that the agent and party were unable to get enough crackers, or soda biscuits, at lunch on board. We gave them several large tins of biscuits and a good supply of tinned meat and some tins of milk.

They had begged for a tin or two of milk for the babies. One baby had lost

© Elmendorf

LOOKING DOWN MARKET STREET, SAN FRANCISCO, TOWARD THE BAY

This, the principal business thoroughfare of California's great seaport, is more than three miles long. The ferry station (with the tower) at the end of the street is the busiest in the world, more than 50,000,000 persons passing through it in one year.

his mother and had nothing to eat. These islanders love babies and often adopt another's child as their own; so a little one may have three or four mothers.

When the supply ship is a long time coming, the diet of fish and coconut becomes very tiresome. Their supply of tobacco was exhausted also; so brisk trading went on.

The people are bright and healthy looking and seem very industrious, making excellent hats, mats, fans, and baskets.

The island was swept by the sea in 1914. There was no wind, but about four o'clock in the afternoon enormous waves began marching upon the beach. All the houses on the narrow strip of land were soon swept away, and the people had just sufficient time to launch their large boats in the lagoon, where they spent the night, riding out the storm in safety, with their boats tied with long ropes to the larger coconut trees. When we arrived they were just getting their houses rebuilt with lumber brought from New Zealand.

A NATIVE DANCE ARRANGED FOR THE VISITORS

The natives arranged a dance for us. This is their one form of amusement and entertainment. They had a regular team, ten boys and ten girls, who went through an elaborate dance in perfect unison. One of the boys was the leader and announced the changes on a boatswain's whistle, while the time and music were furnished by a band of men and boys beating on weird drums and wooden resonators, whose loud, shrill notes could be heard for miles.

Each dancer stands alone, and the evolutions depend largely upon the suppleness of ankle, knee, and hip.

As we were leaving, after distributing gifts of tobacco, food, and clothing, the natives lined up to shake hands, loading us with gifts of pearl shells, mats, fans, and strings of beads, some even giving us the hats they were wearing. The girls gave us their bead necklaces.

The chief industries on these islands are the gathering of the nuts from the dense groves of coconut palms which cover all the visible land, making the copra, and diving in the lagoons for pearl shells. Some bananas and papayas were growing near the village and nearly all these islands have their pigs and chickens.

We arrived at Apia, Western Samoa, late in June, after stopping for mail and supplies at Pago Pago. The Western Samoan Islands are now under the mandate of New Zealand, and a visit to the magnetic, meteorological, and atmospheric-electric observatory located at Mulinuu, just outside of Apia, was the chief object of our stop here.

We were entertained in Robert Louis Stevenson's old home at Vailima, which is now the Governor's residence. We went swimming by moonlight in the artificial pool which Stevenson had built in a beautiful place back of his home, hollowed out in the bed of the shady mountain stream of clear, cool, sparkling water, just at the foot of a little cascade, where one may play in the caress of the natural shower, pulled and tugged by the strong, yet gentle hands of the falling water.

A gate has been built in the retaining dam, so that the pool may be filled or emptied at will.

Almost overhanging this pool is a mountain which was Stevenson's favorite haunt, the crest overlooking his home and facing a beautiful outlook over the town, harbor, and coast. The winding pathway leading to the top is steep and is overhung with tropical vegetation.

At the very summit, in a little cleared space, in the midst of this tropical jungle, surrounded with beautiful red hibiscus blooms, Stevenson and his wife lie buried.

UNIQUE FISHING METHODS

During our leisure moments we visited the "jumping rock" and joined the native girls in their running leap from the bank far out over the stream, to plunge 40 feet to the surface of the deep pool below, at the foot of a waterfall.

We wandered out over the coral reef and watched the natives fishing. One would hold a short net over the outer end of an opening in the reef, while his companion would drive the fish into the net by thrusting a long pole into the water as he walked along one side of the opening.

The women were hunting among the small cracks in the reef for cuttle-fish, which they consider a great delicacy. Armed only with a long, sharp stick, they

Photograph by Putnam and Valentine

THE LIGHTHOUSE AT GOLDEN GATE, SAN FRANCISCO

Much of the romance, commerce, and adventure following in the tracks of the Pacific trades passes through this mile-wide strait. Chrysopylæ, or Golden Gate, was the name given it by Frémont in 1848.

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THE BOAT MARKET IN PANAMA CITY

The waterfront at Panama City is a scene of picturesque confusion. Its trade has always been important, especially so since the completion of the Panama Canal. Panama City is the oldest town on the mainland of America, being founded in 1519.

Photograph by H. C. Mann

THE CAPE HENRY LIGHT WAS SIGHTED BY THE "CARNEGIE" EARLY ONE MORNING IN NOVEMBER, AFTER AN ABSENCE OF 25 MONTHS

The lighthouse in the foreground has superseded the one in the background, which was the first light built by the United States and which served as a beacon to ships sailing into port between Cape Charles and Cape Henry for more than a hundred years.

walk along, poking into the holes in the reef. When they strike a soft object and the water turns a dark bluish black, they begin to jab and twist the stick until the long tentacles armed with suckers come stealing out of the hole and up the stick to fasten themselves on the arms of the native.

Finally the cuttle-fish comes out of his hole; the woman seizes it in both hands and, with one strong bite of her powerful teeth on the head of the fish, its tentacles relax and the catch is dumped into the basket carried over her shoulder.

Another native was fishing in the shallow water near the shore with a long three-pronged spear, wearing goggles to enable him to see under water and stooping below the surface to spear the fish which would gather for the bait scattered about. When he would succeed in spearing a fish, he would stand up and, with a quick twist, throw it off the point on to the beach, where his small son would pick it up, string it on a forked stick, and place it in the water to keep fresh.

Sometimes all the women of the village would journey to the shore, carrying a large net on their heads, and with much sociability and shouting wade out into the deep water, set the net, and drive the fish into it.

This reminded us of other methods we had seen the natives use to snare the harmless, unsuspecting, yet necessary, fish. In the earlier days we had seen the native sailing across Colon Bay in his small dugout canoe, reclining at ease in the stern, steering with one hand and managing the sail with the other, with his foot resting on the gunwale, while fastened to his great toe was a trolling line which he trailed astern. The wiggling of the toe served to give the hook the jump necessary to attract the fish.

At St. Helena the natives fish at night with a lantern at the stern of the boat. The idle hook, resting in the midst of the fish, which flock to see the light and stop to pick up the scattered bait, is suddenly jerked through the group, snaring the unlucky one which happens to be in the way.

Contrasted with the industry of the women, we saw a native man, clothed with a soiled piece of calico twisted about his waist, sitting alone on the warm sand of the beach in the shade of the palm trees, gazing out over the surf. Apparently unable to concentrate his thoughts, he decided to have a smoke. Glancing around, he selected a dry stick, split it, and, rubbing one part on the other leisurely until a groove had been formed and a small pile of powdered wood had been collected at one end, he suddenly began moving one stick rapidly back and forth in the groove of the other until the heat thus generated started the powdered wood to smoking and glowing.

Twisting a small bundle of dried banana and coconut-palm leaves, he set this on fire by dumping the glowing pile of wood powder upon it and holding it up to the breeze. When it was well ablaze he placed it on the ground and began piling twigs and branches over it until he had a fire going. Then, searching amid the débris at his side, he selected a long piece of dry banana leaf and split it to proper width; next he tore it off and laid it upon his knee. Reaching into the twisted piece of calico about his waist, he pulled out a roll of tobacco leaf, selected a small amount, replaced the balance, and leisurely rolled the tobacco in the piece of dried banana leaf, fashioning a cigarette some six inches in length.

Picking up one of the glowing twigs from the fire, he was soon enjoying his long smoke. All this was done without moving from his position, and apparently he was oblivious of the foreigner who was seated on the sand not far distant watching the whole performance. Thus does the native break the monotony of existence in the South Seas. When he tires of smoking, he will rest and philosophize again.

PHYSICIAN LEFT AT RAROTONGA

It was now time to sail for Panama, and then on home to Washington. On the way it was necessary to stop at Rarotonga for one day, to leave our doctor at the hospital to recover from a seriously infected arm. During the first five days after the doctor had been left ashore, six patients came to try out the medical ability of the captain, who had to be the temporary physician.

They seemed to be more than satisfied with the doses given; at least, they did not return for more.

On the voyage through the stormy southern latitudes the rudder stock was splintered and rendered useless during a heavy gale. In the one day's calm between storms we were able to send down the royal yard and rig it up across the quarter-deck as part of the temporary steering gear, or "jury-rudder."

HOMEWARD BOUND

Coming up through the southeast trades toward Panama, we saw numbers of the wandering albatross, Cape pigeons, bos'n birds, whales, porpoises, bonitos, and flying fish. Frequently in the morning Mike, the cat, would have that satisfied look which comes after a full meal, and the fins and tails of several flying fish found on deck told the story. Doubtless, attracted by the ship's lights, they had flown on board during the night.

Many specimens of marine life would come to the surface of the sea during calms. Hidden beneath the tiny Portuguese man-of-war, or physalia, we would find several tiny little fish, less than one inch in length, very highly colored, the brilliant blue stripes contrasting vividly with the rich silver sheen of their scales.

Sailing up through the Gulf of Panama, 12 snakes were seen during the day, some being three feet in length, with dark, yellow-spotted back, yellow belly, and flat spatulate tail. During heavy rains the rivers carry hundreds of these snakes down into the sea from the interior.

The Director, Dr. Bauer, joined us at Panama on one of his inspection trips and accompanied the party on the voyage to Washington.

After passing through the Panama Canal, dodging the hurricanes of the West Indies, and weathering the usual storms off Cape Hatteras, we at last sighted the light at Cape Henry early one morning in November and were soon at home again, after an absence of 25 months.

It is a wonderful experience to sight a light flashing regularly in the night whereas for several months there has been nothing to see except the vast expanse of

ocean by day and only the illimitable stars by night. The navigator passes the word that at a certain hour a light should be visible dead ahead, and all eyes are eagerly strained to see the light sooner. Then follows a thrill when the cry of "Light dead ahead, sir," comes ringing down from aloft. How much greater the thrill when the light points the way to our own home port, after an absence of over two years!

The purposes of these expeditions could not have been accomplished without the splendid perseverance in the face of difficulties and hardships and the hearty spirit of loyalty and coöperation shown by every member of the various parties.

We had seen many interesting places and had met many strange people, yet the sight of our own home land and of the loved ones who were awaiting our return was a very welcome end to our travels, and we decided that no other country could ever take the place of our own.

A large amount of magnetic, atmospheric-electric, meteorological, and geographical data was obtained. Observations were made daily, no matter what the conditions—fair weather or stormy, whether the vessel was hove to in a gale, running before the storm like a frightened bird, or drifting aimlessly in a calm. Everyone was busy each day from morning until nightfall.

Within a week after arriving at any port the completed results were on their way to Washington, where they were forwarded, free of charge, to the different hydrographic bureaus of the world for use in the preparation of their nautical charts and publications.

THE SOCIETY'S NEW MAP OF THE WORLD

WITH this issue of its Magazine, the National Geographic Society presents to its members a New Map of the World—the third of a series of handsome wall maps in colors issued as supplements with THE GEOGRAPHIC during 1922 and the seventh since February, 1921, representing an expenditure of more than $200,000.

The World Map is the product of several years of research and labor. It is drawn on a specially devised projection, which materially reduces distortions of size and shape, the most serious defects in the familiar Mercator projection. An additional advantage of the present product over most wall maps of the world is the presentation of the Pacific Ocean in its entirety, thus enabling the user to obtain a clear idea of the extent of the mandates and island possessions in the South Pacific.

The several mandates are clearly distinguished from colonial possessions by the use of striped lines, which do not indicate the exact water boundaries of the mandates, but merely include the islands affected by each. Mandated areas in Africa are similarly indicated by diagonal stripes in the color of the country exercising the mandate (see also The Society's large Map of Africa issued in October, 1922).

In South America areas in dispute between Peru and Ecuador, Peru and Colombia, and Colombia and Venezuela are indicated by alternate colors of the countries affected.

The inset maps of the Polar Regions, in the upper corners of the map, will prove of special value to readers interested in Arctic and Antarctic explorations, while the charts showing density of population and prevailing winds, ocean currents, and vegetation will prove useful for ready reference.

The Society's next supplement will be a splendid wall map of the United States, of convenient size, to be issued with an early number of THE GEOGRAPHIC.

Additional copies of the Map of the World may be obtained from the headquarters of The Society in Washington—paper, $1.00; on map linen, $1.50.

Aretic Circle
EUROPE
ASIA
AFRICA
Equator
Monsoons
South East Trade Winds
South East Trade Winds
INDIAN OCEAN
DENSITY OF POPULATION AND PREVAILING WINDS
Uninhabited Regions
Under 1 Person per Sq. mile
1 to 25 Persons per Sq. mile
25 to 100 Persons per Sq. mile
100 to 400 Persons per Sq. mile
Over 400 Persons per Sq. mile
Arrows: indicate direction of prevailing Winds
Length of Arrows indicate Constancy of prevailing Winds
0° Longitude 30° East from 60° Greenwich
75°
90°

THE WORLD

PREPARED ESPECIALLY FOR

THE NATIONAL GEOGRAPHIC MAGAZINE

GILBERT GROSVENOR, EDITOR

SHOWING THE

POLITICAL DIVISIONS, including those established after the World War

International Boundaries ——— Provincial Boundaries (in Australia and Canada) ———

Railroads (in the United States, Canada, Europe, India and in the developed parts of South America only the Trunk Lines are shown)

Capitals ..... Other Places .....

Airplane Routes in operation

Airplane Routes authorized, but not yet in operation

Airplane Routes that have been flown, but not yet commercially adopted

Equatorial Scale: 1 inch = 625 miles

NOTE: The color lines shown in the Pacific are not actual boundaries but include groups of islands belonging to the various countries.

The Mandated Areas in the Pacific are inclosed by colored stripes.

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This Map is drawn on Van der Grinten Projection

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NORTH POLAR REGION

SOUTH POLAR REGION

NATURAL VEGETATION AND OCEAN CURRENTS

DENSITY OF POPULATION AND PRINCIPAL TOWNS

VOLUME XLII NUMBER ONE

THE NATIONAL GEOGRAPHIC MAGAZINE

JULY, 1922

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With 34 Illustrations — DR. ANDRÉ VIALLES

Midsummer Wild Flowers
38 Species Illustrated in Full Color

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NATIONAL GEOGRAPHIC SOCIETY
HUBBARD MEMORIAL HALL
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ORGANIZED FOR "THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE"

TO carry out the purposes for which it was founded thirty-four years ago, the National Geographic Society publishes this Magazine. All receipts are invested in the Magazine itself or expended directly to promote geographic knowledge.

ARTICLES and photographs are desired. For material which the Magazine can use, generous remuneration is made. Contributions should be accompanied by an addressed return envelope and postage.

IMMEDIATELY after the terrific eruption of the world's largest crater, Mt. Katmai, in Alaska, a National Geographic Society expedition was sent to make observations of this remarkable phenomenon. Four expeditions have followed and the extraordinary scientific data resultant given to the world. In this vicinity an eighth wonder of the world was discovered and explored—"The Valley of Ten Thousand Smokes," a vast area of steaming, spouting fissures. As a result of The Society's discoveries this area has been created a National Monument by proclamation of the President of the United States.

AT an expense of over $50,000 The Society sent a notable series of expeditions into Peru to investigate the traces of the Inca race. Their discoveries form a large share of our knowledge of a civilization which was waning when Pizarro first set foot in Peru.

THE Society also had the honor of subscribing a substantial sum to the historic expedition of Admiral Peary, who discovered the North Pole.

NOT long ago The Society granted $25,000, and in addition $75,000 was given by individual members through The Society to the Federal Government when the congressional appropriation for the purchase was insufficient, and the finest of the giant sequoia trees of California were thereby saved for the American people and incorporated into a National Park.

THE Society is conducting extensive explorations and excavations in northwestern New Mexico, which was one of the most densely populated areas in North America before Columbus came, a region where prehistoric peoples lived in vast communal dwellings whose ruins are ranked second to none of ancient times in point of architecture, and whose customs, ceremonies and name have been engulfed in an oblivion more complete than any other people who left traces comparable to theirs.

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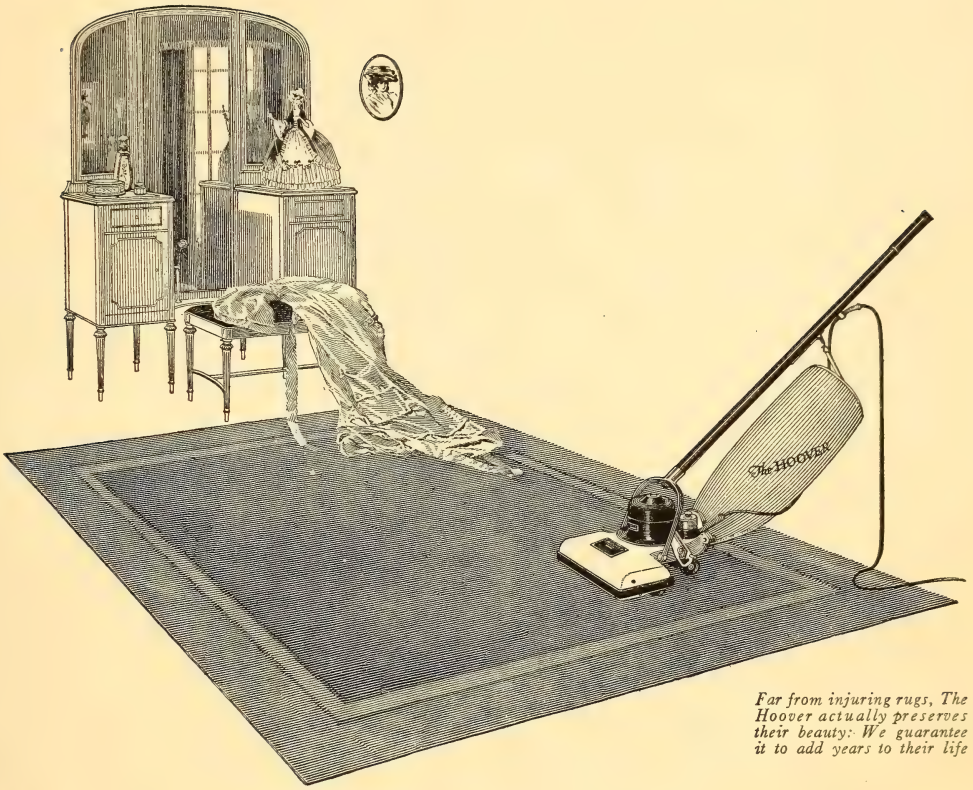

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It BEATS.... as it Sweeps as it Cleans

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Is it the fault of the parents when children do not have good teeth?

DIET experts claim that the average person eats entirely too much refined food nowadays — food lacking in vital mineral salts.

Also, that the average man, woman and child eats too much soft, pasty food—food that can be swallowed whole — that robs the teeth and jaws of their proper task of grinding the food and preparing it for digestion.

The result is that a perfect set of teeth in a child more than 8 years of age is uncommon. And a *perfect* set of nerves in a man or woman of 30 or more is almost as rare.

We Are What We Eat

Your doctor can tell you that your physical well-being, as well as the strength and vitality of your nervous system, is largely a matter of *food*.

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VOLUME XLII NUMBER TWO

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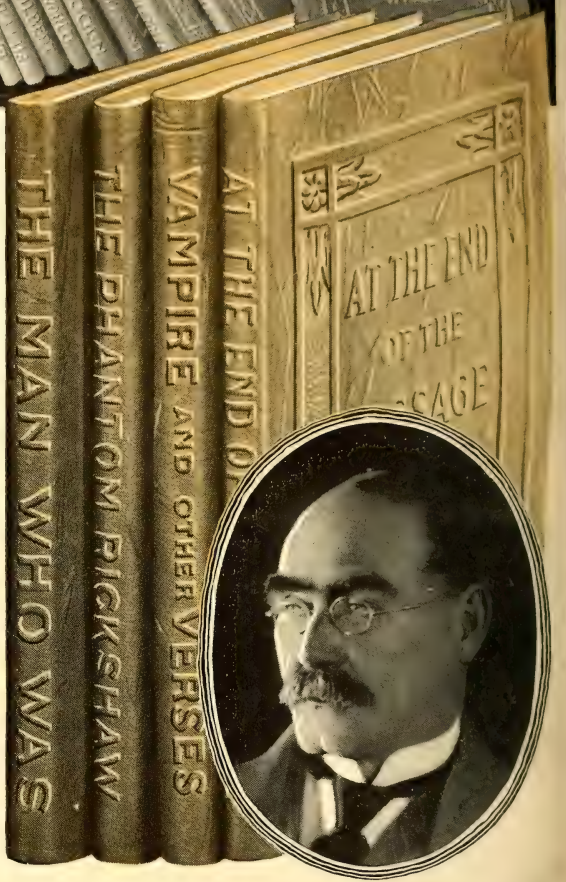

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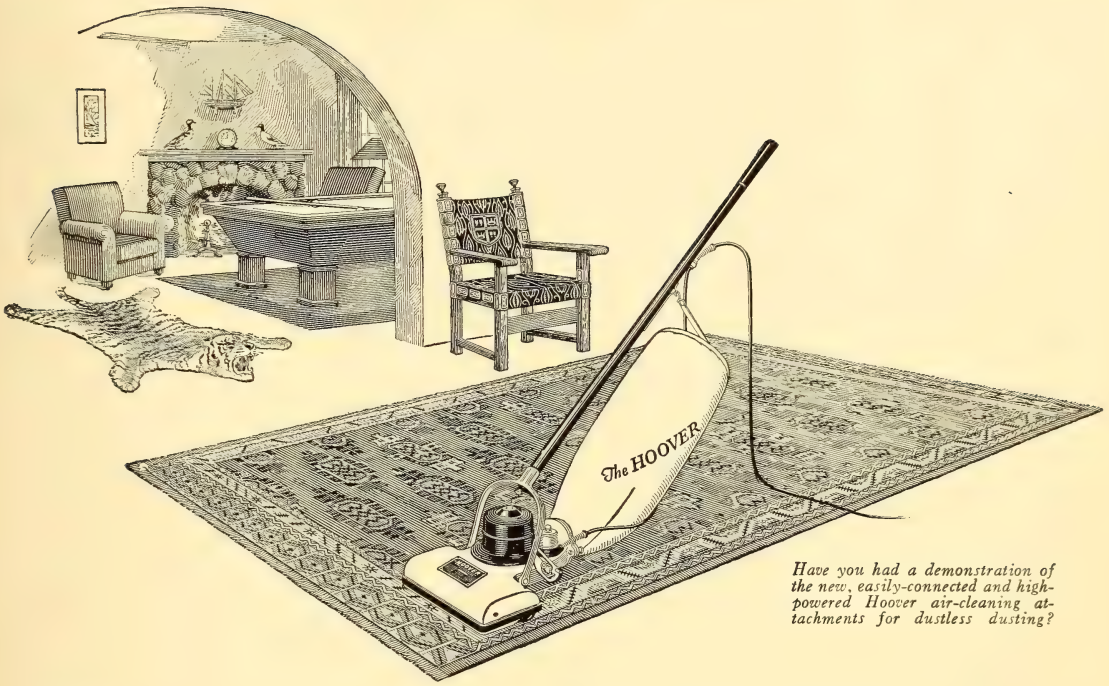

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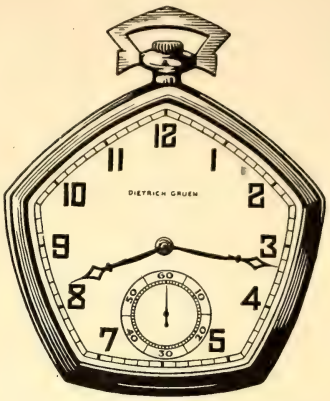

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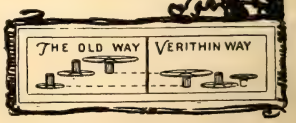

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VOLUME XLII NUMBER SIX

THE NATIONAL GEOGRAPHIC MAGAZINE

BUREAU OF AMERICAN ETHNOLOGY LIBRARY NOV 29 1922

DECEMBER, 1922

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Is this a Critical Time for your Hair? It is for your daughter's

THESE GIRLHOOD YEARS are critical for your little daughter—perhaps the *most* critical so far as her *hair* is concerned. Like the rest of her growing body her hair at this time demands extra nourishment and attention.

Teach her how to care for it correctly. Explain to her that proper care now will insure lovely shining tresses to tuck up on her pretty young head when her school days are over.

And how about you? Is this a critical time for *your hair* also? Certainly it is if you are troubled with dandruff—or if your hair is too oily or is dry and brittle.

Take care. These conditions eventually cause hair to become noticeably thinner and to lose its charm and attractiveness. Start now to correct them.

Keep your own hair looking its best. This is the finest incentive you can give your daughter. Show her how to follow the Packer Method of Shampooing. She will not need your help after the first few times.

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The Packer Method is built around the use of pine tar. Physicians, you know, have long recognized that pine tar has a tonic effect on the health and appearance of the hair. It quickens the action of a marvelous circulation system. Many tiny cells and blood vessels wake up and carry nourishing food to every portion of the scalp.

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Use either the well-known standard cake, or use Packer's Liquid Tar Soap (Packer's Shampoo). Packer's Shampoo, by the way, is delicately perfumed, and has a different fragrance but the *same* dependable Packer habit of bringing health and beauty to hair and scalp.

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Graham

Red Baby Serves the Nation by Serving Agriculture

ONE day, not many months ago, the McCormick-Deering dealers of central Minnesota came to St. Cloud and painted the town red.

It was "Red Baby Day" and the eyes of the motion picture cameras saw the city celebrating. The newspapers issued special editions. Senators and other prominent officials took part in the activities, and business men and farmers in thousands were caught up in a great wave of community enthusiasm.

On that day these McCormick-Deering dealers came into proud possession of the "Red Baby" Service Trucks mobilized in the above photograph. Before night they drove 162 bright-red International Speed Trucks out into the counties around St. Cloud and set them to work—not for resale but for actual use in the betterment of farming. Since that day the "Red Babies" have lived on the roads, distributing equipment, information, repairs, and special aid—carrying everywhere the methods that increase production and wealth.

* * * *

This middle-western incident merely typifies the "Red Baby" enthusiasm that has swept the nation. St. Cloud speaks with a small voice compared with the mighty call for International Speed Trucks that has come from the great McCormick-Deering dealer organization. During this present season a constant procession of "Red Baby" Service Trucks has trailed out of Boston, out of Los Angeles, out of Winnipeg and Jacksonville, out of all International branch house cities into the service of Agriculture.

In a hundred days' time the vast fleet of "Red Baby" trucks, owned and used exclusively by the McCormick-Deering dealers, has given a new value to the familiar term "Service." "Red Baby" has become a household term, the truck a familiar sight and influence in thousands of rural communities. A new demand for modern farming methods is in evidence, and the alert service that doubles the dealer's worth now speeds to the doorsteps of American farms.

Farm products, the staff of life, find their way into cities and over oceans in richer flow because the "Red Baby" is leading the way to better, more profitable farming. The "Red Baby" is rightly called "The Nation's Service Truck."

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